Vol. XXI. Part 3.

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The Journal of the Department of Agriculture of Victoria, Australia.

March, 1923.

PRINCIPAL CONTENTS

Beet Sugar Industry

Nhill Crop and Fallow Competitions

Successful Dairy Farming

Passion Fruit Culture

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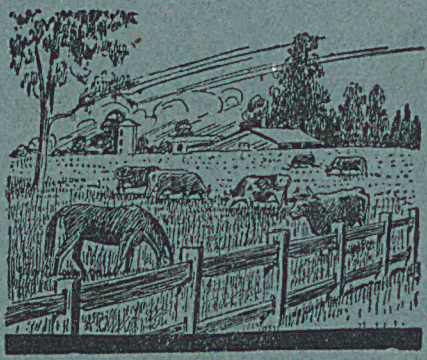

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OF

THE DEPARTMENT OF AGRICULTURE,

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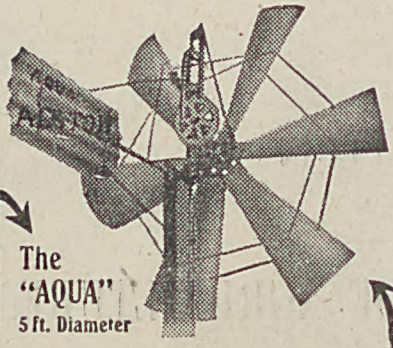

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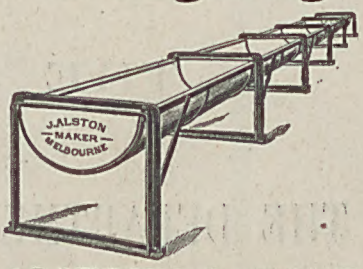

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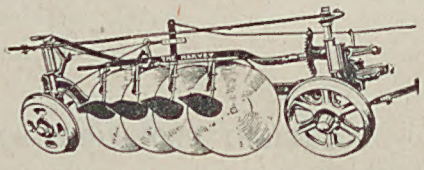

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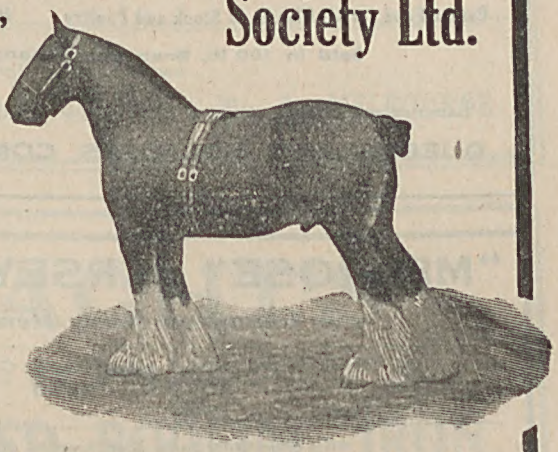

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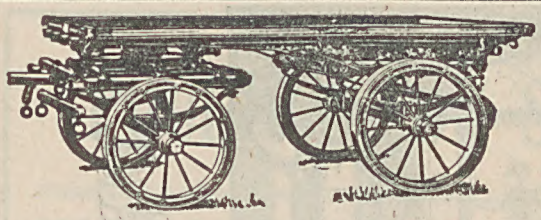

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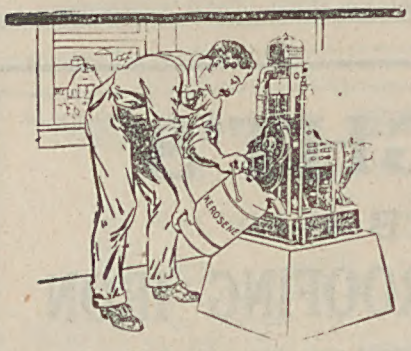

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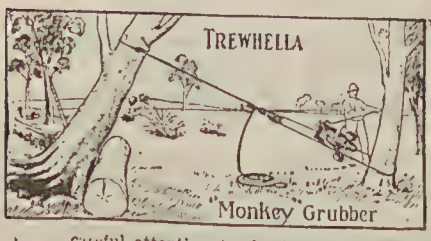

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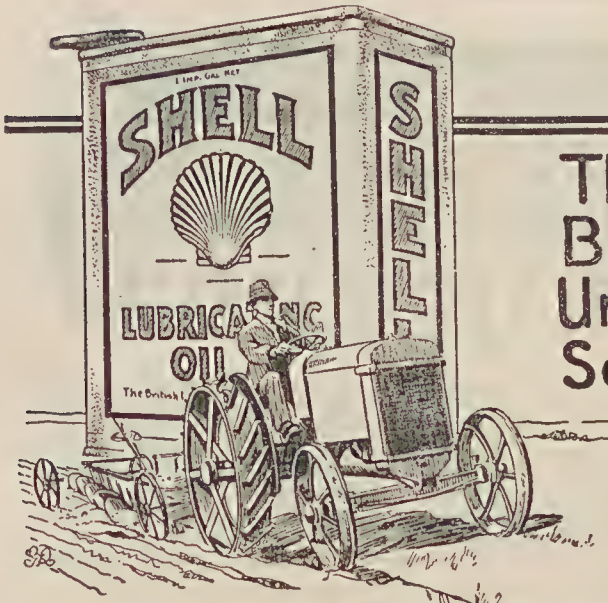

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1 Make certain that the cultivating tines are attached to two independent sets of floats, two rows of tines to be attached to the front float and two to the rear float, and that each float is operated by a separate lever, so that you can regulate the depth of sowing and cultivating to different depths if desired, or so that you can sow without cultivating. This is the most important point on any cultivator-drill.

2 Make certain that the main frame has enough breadth to insure ample clearance between the tines. Farmers in Mallee country should have at least 3 feet between the front and rear sets so as to give space for stumps to clear without the operator having to stop the machine and work out the stumps by hand. If the breadth of the main frame is less than 6 feet it would be difficult to secure sufficient clearance. Farmers should satisfy themselves on this point before ordering any make.

3 Make certain that there is a regulator on your machine to enable you to change the amount of fertilizer sown while your machine is in motion. Every modern farmer knows that there are parts in most paddocks where a little more or less manure will increase the yield.

4 Make certain that the main wheels are higher than usual. They should be at least 4½ ft. high with staggered spokes and wide channel steel tyres.

5 Make certain that you have a live axle going through the total width of the machine. It costs the most to build but it adds strength and insures permanent alignment for the moving parts which means longer life, less delays, and fewer replacements.

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THE JOURNAL

OF THE

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OF

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Vol. XXI. March, 1923. Part 3.

BEET SUGAR INDUSTRY.

SUGGESTED IMPROVEMENTS AT MAFFRA FACTORY.

Investigation in America.

Towards the end of last year, Mr. Williams, the manager of the Maffra Sugar Factory, visited the United States of America to obtain information to enable the Government to decide the best way of increasing the capacity of the Factory. A copy of a report submitted on the subject is appended, as well as a copy of a general report of Mr. Williams' investigations into the Beet Sugar Industry in America.

Recommendations Regarding Maffra Factory.

As a result of my visit to America, I wish to recommend that the Maffra Sugar Factory be reconstructed as soon as possible, to increase its capacity from 300 to 600 tons of beets per day. The American type of plant is desirable, because it is specially designed for efficiency and economy of labour and material. Our conditions are very similar to those of America.

The cost should be, approximately, £100,000.

The task of reconstruction will be more difficult and intricate than the construction of a new mill, and could hardly be undertaken by contract. Consequently, I recommend that a first-class beet sugar engineer be secured to plan, specify, and lay out the whole work, and, if possible, supervise the reconstruction. Thoroughly qualified engineers for this class of work are very hard to procure; and in the absence of sufficient authority, I deferred action until my return, and attach herewith my proposals and the possibilities for proceeding with the work.

It is desirable, and may be possible, to lay out the work from February to June, 1923, and reconstruct from July, 1923, to February, 1924, in time for the 1924 manufacturing season.

1. I consider the investment essential for many reasons, but mainly because the present factory plant is old, inefficient, and uneconomical.

2. Reducing prices of sugar call for labour-saving machinery and a larger turnover.

3. Irrigation offers important possibilities for expansion in our district, which is undoubtedly suitable for beet growing.

4. American beet sugar manufacturers consider a 500 ton per day mill the minimum size desirable.

I am submitting a list of likely alterations to the present plant as a basis for full consideration.

Later on it may be necessary to install pulp driers, and I would like to give every consideration to the possibility of manufacturing power alcohol from our molasses, which at present is not saleable to advantage.

Whilst admitting an element of risk in the extension of any industry, and especially one which is practically new to us, the advantages of successful expansion of rural industries are so great that the risk is well worth while. Furthermore the industry has reached a stage where it must definitely step forward on safe lines or hopelessly drift back.

Assuming that the Factory is reconstructed on a 600 ton per day basis, I estimate we should be successful with a full area of 4,000 to 5,000 acres, and allow per pound of sugar produced—

To growers for beets	1½d. per lb. of sugar
Manufacturing costs ..	1d. „ „ „ ..
Overhead expenses and profit ..	½d. „ „ „
Total	3d.

Towards reconstruction we are in credit, though the amount is unreserved, for—

	£
Depreciation	25,309
Profit	20,187
Total	45,496

Beet Sugar Industry in America.

Herewith I am submitting a general report of my investigations into the beet sugar industry of America in as far as it may be of serviceable interest towards the Maffra Beet Sugar Factory.

As leading up to the investigation, I propose very briefly indicating the position at Maffra.

The Maffra Sugar Factory was constructed in 1898, and operated for two seasons unsuccessfully, when it passed into the hands of the State Government as chief creditor. One calls to mind that America experienced many failures at the start with their small factories and lack of experience, and not until they developed larger plants and

organizations suitable to their peculiar requirements did success come.

Although beet growing experiments continued, the Maffra Factory remained closed until 1910, when it reopened on experimental lines. Owing to indifferent seasons and various initial difficulties, the results for some time were not as satisfactory as hoped for. Recently conditions have been more favorable, and the operations in field and factory have become better understood and more fully appreciated. The result is that the losses incurred since the balance-sheet period (1912-13) have been made good, a profit of £20,187 has accrued, and the plant has been fully depreciated. This season growers became so interested that an area well in excess of the present plant's capacity was offered, and quite an extensive acreage had to be reluctantly refused. Furthermore, the Government irrigation scheme for Maffra and district is well advanced, and, as a result, it is reasonably expected that beet-growing will attract wider attention, and considerably expand its acreage.

The present factory plant is old, inefficient, and uneconomical, and its capacity is not now considered large enough to economically cope with present day conditions.

Growers need attractive prices to grow sugar-beets, but the price of sugar is decreasing in Australia, and the only way to successfully meet the situation is to reduce manufacturing costs by treating larger quantities of beets with the most up-to-date labour-saving and efficient machinery.

These considerations, coupled with the importance of developing rural industries, influenced the Government to institute inquiries into the beet-sugar industry of America, with a view to bringing the Maffra plant up to date.

I left Melbourne on 22nd August, reached California on 21st September, inspected some of the most important sections in America associated with the beet-sugar industry, left there on 10th November, and reached Melbourne on 9th December, 1922. The following factories and places of interest were visited:—

Waialua Cane Sugar Factory, Honolulu.
C.P.C. Pineapple and Alcohol Works, Honolulu.
Honolulu Ironworks, Honolulu.
Anaheim Beet Sugar Factory, California.
Oxnard Beet Sugar Factory, California.
Manteca Beet Sugar Factory, California.
Brighton Beet Sugar Factory, California.
Greeley Beet Sugar Factory, California.
Eaton Beet Sugar Factory, California.
Fort Lupton Beet Sugar Factory, California.
Toledo Beet Sugar Factory, Ohio.
"Larro" Stockfeed Mills, Ohio.
Western Sugar Refinery, California.
Mason By-products Factory, California.
Department of Agriculture, Washington.
A number of agencies and offices associated with the beet sugar business.

The large amount of time required for travelling allowed but a very limited period for the direct investigation of the industry. Every-

thing seen was very interesting, and those associated with the industry extended every possible courtesy and assistance.

Throughout America the industry has recently experienced a severe crisis. During and after the war sugar prices soared to extreme heights (1s. 3d. per lb.), with the result that, during the boom, a great many reckless liabilities were incurred. From extremely high, prices suddenly receded to extremely low, some factories accepting as little as 2d. per lb. for their sugar. This sudden unfavorable change naturally occasioned serious losses and difficulties, but also brought some good steadying results in its train. The factories applied rigid economies, while manufacturers and growers came together, and arranged a safe and fair system of price-fixing for beets. The companies now guarantee a minimum price for a standard quality beet, the price to advance with the sugar content and the selling price of the resultant sugar.

This is the application of a very desirable co-operative principle, and will help to steady and stabilize the industry, and safeguard the interests of all parties.

As a result of the sugar crisis all factories met with trouble, and some became rather seriously involved financially. The beet acreage naturally decreased somewhat, but with sugar values now very firm the situation ahead appears to be quite promising.

The favorable way in which the factories as a whole weathered the storm is one of the strongest reasons for recommending an extension of the industry at Maffra. One may easily gain a favorable impression when things are booming, but when the industry has successfully survived so severe a test, its tenacity appears a most important, safe, and commending characteristic.

Throughout California, beet-growing has recently experienced very hard times, for, in addition to the extreme and disconcerting variations in sugar prices, pests and diseases have been particularly troublesome.

Nematodes or minute eel worms attack the beet roots, and absorb the sap to such an extent that the beets become stunted and fibrous. The size of the roots and the sugar content are both seriously affected, and the resultant crop often becomes quite unprofitable. Rotation appears to be the only useful remedy, and as the nematodes live and develop on many crops, the best rotation for infested lands is to be found in grain and hay crops.

The white fly, a leafhopper which periodically attacks the beets in California, is quite a problem. Clean farming and good cultivation are recommended, but no really effective remedy has yet been found.

As at Maffra, cutworms, white grubs, and other pests sometimes cause trouble, but may be controlled.

A creeping weed, commonly called "Morning Glory," has in a few sections, impoverished the soil, and is very hard to cope with. These troubles are mentioned to indicate the importance of applying scientific methods and clean cultivation in beet-growing, so that healthy and profitable crops may be encouraged to the utmost by wholesome farming.

California's strongest point seems to be the exceptionally high sugar content of the beets grown there. Beets ranging from 17 to 19 per cent. are usual, while other States run from 14 to 16 per cent. of sugar. It is to be hoped that this very strong point may encourage those

interested in the industry to develop successful means to combat the pests and diseases recently so prevalent in California.

In this State are located the largest beet sugar factories in America. At one of these factories a most interesting experiment is being conducted by the Oliver Press Company for the filtration of first carbonatation juices.

The new Oliver thickener, with a series of filter pipes under vacuum, partially filters the juice, and the thickened remainder passes to an ordinary Oliver filter press, which completes the work with a minimum of labour and filter cloth. The results appeared to be very satisfactory, and the outfit both efficient and economical. Other factories will probably give it an extended trial next season, and in remodelling the Maffra plant this method is well worth consideration.

Another factory is installing a complete plant for distilling its molasses into industrial alcohol, carbon dioxide gas, and other by-products which are expected to prove profitable. This is a matter of special importance at Maffra, which has too small a production of molasses to safely introduce the Steffens de-sugarizing process. The manufacture of power alcohol is quite feasible and well worth consideration.

Colorado and the beet sugar States of the mid-west and north-east appear to have the sugar industry strongly and safely established. As much time as possible was spent in Colorado, because at the moment it is undoubtedly the ideal beet sugar State.

Amongst others, the Great Western Sugar Company is strongly established there, and near by with sixteen factories, controlled by a first class organization. Travelling expert supervisors are constantly moving from factory to factory, and a wholesome competitive spirit is abroad to promote efficiency and speed.

The beet lands of Colorado are high class, irrigated, and generally well cultivated. Heavy seeding is practised, and rotation of crops encouraged. Alfalfa, to potatoes, to beets is there considered the most desirable rotation. Beet pests and diseases are well controlled by the companies, who specialize in all matters pertaining to the welfare of the industry. There is a general tendency to widen the beet rows from 18 inches to 20 or 22 inches. No beet harvesting machine has yet been adopted, but the problem is receiving considerable attention, and a machine suitable for large areas is likely to become available.

All beets delivered at the factories or sidings are now cleaned and dumped by ingenious mechanical devices, the weeds and dirt being returned to the growers. Colorado has one special difficulty in the storage of its beets. The beets do not reach maturity until rather late in the autumn, and the harvest period is necessarily brief owing to the risk of hard frosts. As a result, large quantities of beets have to be stored in piles 9 feet high, and subsequently re-loaded and forwarded to the factories at the end of the season. This involves additional costs for handling as well as a considerable loss of sugar, and it is fortunate that our district has no such difficulty to contend with.

For the 1922 season, thinning, hoeing, weeding, and topping by contract cost growers $18, or £3 15s., an acre, but this rate may advance.

A large number of farmers now grow small areas of beet, and attend to most of the labour themselves. Full costs of growing run

about £10 to £12 an acre, and yields are expected to average 10 tons, worth a minimum of £10 8s. 4d., and probably £15 12s. 6d. if sugar prices continue firm.

Profitable use is made of the beet tops for stock feed. Beet-growing costs are generally higher at Maffra than in America, but this is likely to be offset by the better yields that may be expected under irrigation in our district.

Regarding factory matters, our class of general labour is probably more capable, but less keen, than the American general labour.

Our plant is naturally less efficient and uneconomical, but may be satisfactorily reconstructed.

By mechanical and managerial efficiency, the Americans are getting wonderfully improved results from their factories. Speed of process is the successful keynote in manufacture, as it has been found to make for efficiency as well as economy.

Special efforts are continually put forward to eliminate weeds and rubbish. Heating and refining methods are always under consideration for improvement. Speed and continuity of process are encouraged. Scientific investigation is receiving greater attention, and the production of fine, attractive, well-graded sugars has been very successful.

Under difficult conditions, the Maffra plant has accomplished good results, but with an up-to-date plant it may be expected to produce an improved sugar more economically. To increase the factory's capacity from 300 to 600 tons of beet per day the following requirements are submitted as a basis for consideration:—

Additional beet bins and flumes.
Trash catchers.
Enlarged lime kiln.
* Automatic scales.
* New Maguin beet slicer and fittings.
Chains for diffusion battery.
Diffusion measuring tanks.
New first carbonators, complete (4).
Rearrange second carbonators and sulphur tanks.
* New sulphuring outfit and rotary burner.
* New plate and frame presses (5) for first carbonators or two new type Oliver thickeners and presses.
Rearrange old presses for other filtration.
Rearrange evaporators for vapour heating and consider a fifth effect.
Install eight or ten juice heaters complete.
One new white sugar pan, complete, with condensing outfit.
Rearrange old pans, supply tanks, &c.
* Install one set of five new centrifugals, and add two to present set. Consider electric drive for these.
Rearrange granulator with screens, hoppers, &c.
Crystallizers are O.K.
*Install automatic sugar scales, sewing machine, and belt conveyors.

* These items may have to be purchased abroad, the balance should be procurable locally.

Rearrange mixers, blowups, tanks, &c.
Move twenty cellar tanks outside for molasses storage.
Construct 500-ton molasses tank.
New Corless type engine, driver connected to generator (about 500 h.p.).
Electric transmission, motors and centrifugal pumps.
Four new Babcock & Wilcox boilers, complete, with mechanical stokers (about 350 h.p. each).
Coal handling system and ash flumes.
General factory rearrangements.
General yard rearrangements.
Supervision and incidentals.

Reconstruction of an old plant is more difficult than the construction of a new factory, and should have the services of an experienced and competent beet sugar engineer. Consequently, proposals and estimates for this work have been submitted separately.

When the supply of beet pulp increases at Maffra, it may be desirable to install pulp driers to deal with part of the pulp. The capital expenditure and manufacturing costs are usually high, but the dried pulp is worth from £4 to £5 a ton, and, no doubt, a market could be developed. Furthermore, it is often impossible to satisfactorily store large quantities of green pulp.

Molasses is the other important by-product of the beet sugar industry, and as it is not always saleable to advantage, some profitable means of dealing with it is very desirable. The Steffens de-sugarizing process has been well considered, but the quantity available for treatment is hardly sufficient for the amount of capital involved for the necessary plant.

Molasses may be burned for fuel, but there are difficulties associated with this.

The manufacture of power alcohol or motor spirit suggests itself as a useful and probably a profitable means of treating the molasses.

A formula for a motor spirit considered suitable for ordinary motor engines without alteration is available. The cost of the plant should be reasonable, and a good deal of the necessary manufacturing work could be dealt with during the off-season period. Alcohol plants were inspected, and the demand for motor spirit in Australia warrants consideration of this possibility.

Mechanical, technical, and manufacturing details of the beet sugar industry were inspected as closely as possible, and a great deal of useful information is held for factory use.

Beet seed growing has declined in America, as European supplies are again normal. At the same time, the business will be continued on a limited scale to encourage, by competition, the supply and use of high-grade seed. Dr. Townsend, of the Department of Agriculture, is continuing the extended experiments commenced many years ago to procure a single-germ beet seed. About 60 per cent. result has so far been gained, and in due course it is hoped that the desired seed will be developed, when it is expected, as a result, that the cost of beet thinning may be considerably reduced.

The following brief particulars are submitted as relating to the beet sugar industries of Maffra and America:—

MAFFRA SUGAR FACTORY.

Manufacturing Results.

Year.	Acres Harvested.	Beets Worked.	Sugar Content.	Purity.	Sugar Produced.	Extraction.
		tons.	per cent.	per cent.	tons.	per cent.
1915 ..	990	8,843	17·2	84·7	1,182	13·36
1916 ..	461	4,928	15·45	85·7	560	11·37
1917 ..	1,320	15,159	15·85	85·9	1,948	12·85
1918 ..	1,200	14,487	14·45	80·5	1,650	11·39
1919 ..	1,009	12,289	13·49	82·0	1,263	10·28
1920 ..	1,080	13,084	15·0	84·4	1,551	11·86
1921 ..	1,180	7,147	15·13	83·4	833	11·65
1922 ..	1,602	16,578	14·90	81·2	1,872	11·29

Two thousand three hundred acres have been planted for 1923.

UNITED STATES OF AMERICA.

Year.	Factories.	Acres.	Yields per acre.	Beets.	Sugar.	Sugar Content.	Purity.	Extraction*
				tons.	tons.	%	%	%
1919–20	89	692,455	9·27	6,421,000	726,451	14·48	82·84	12·34
1920–21	97	871,676	9·79	8,538,000	1,089,021	15·99	83·96	13·63
1921–22	92	814,988	9·55	7,782,000	1,020,489	15·77	83·09	13·76

* In many factories the Steffens Desugarising Process improves the extraction percentage.

The 1922-23 results are not yet available, but the acreage was reduced, and the production lowered, because of the very low sugar rates. With improved prices for sugar the results for 1922-23 are expected to be very satisfactory.

The State of Colorado produces nearly 300,000 tons of sugar, and one company—the Great Western Company—has sixteen beet sugar factories and a capital of over £6,000,000.

The world's sugar requirements are at present considered to be about 18,000,000 tons per annum, but with easier prices and a rising standard of living the demand is expected to increase and prices remain reasonably firm. Sugar is one of the very cheapest energy-producing foods in use, and both cane and beet production are necessary to maintain the needful supplies.

In America, beet sugar is grown mainly with white labour, and produces about 800,000 to 1,000,000 tons per annum. Cane sugar is grown mainly with black labour, and yields about 250,000 tons per annum. America consumes 4,000,000 tons per annum, and absorbs the greater part of Cuba's large production.

Australia's consumption is approaching 300,000 tons per annum, and over a term of years the cane industry has not fully met require-

ments. With an increasing population and demand, there is scope for increasing production of both cane and beet sugar.

The Maffra soil and climate, with irrigation added, are undoubtedly suitable for sugar beet growing. The amount of employment and the production of wealth per acre devoted to beet are so great that the industry's economic advantages to the country are quite exceptional. Five thousand acres of beet should employ 750 men directly, and a large number indirectly, and produce sugar worth about £200,000. This would promote population and develop a local market for other farm products. Agricultural methods would be improved, and, because of its by-products, the industry harmonizes well with dairying and stock-raising. Its many indirect advantages are now well known.

Two important lessons are promptly learned by a visit to America. By comparison, one comes to realize what is not generally understood, that Australia is a land of vast possibilities and wonderful resources, with exceptionally favorable conditions for development.

Also, Australia seriously needs a very much larger population.

The beet sugar industry has so many industrial, commercial, social, populating, and decentralizing advantages that one feels safe in advising an extension of the industry at Maffra. As it would cost about £250,000 to build a new 600-ton factory, further extension in the way of new factories might wisely await results at Maffra. At the same time, it may be said that if a full supply of standard quality beets can be produced, an up-to-date factory could be expected to prove successful.

Following careful inquiry and consideration, a recommendation has already been submitted to reconstruct the Maffra plant and increase its capacity from 300 to 600 tons per day. If the proposals are approved and carried out, the success of the industry will very largely rest with the growers. In their own interests, they will need to see that reasonably full supplies of beets are consistently produced, regardless of prices prevailing for other crops.

Through a term of years, experience has shown that the reliability of, and steady prices prevailing for, the beet crop make it one of the safest and most advantageous crops that can be grown, and well worth the continuous loyalty of the farmers interested therein. Last season, some Colorado growers withdrew from beet-growing, thereby exposing their factories to risk at a critical time, but the cabbages and tomatoes grown by them were largely a financial failure, and the promises to grow beets for next season are now excellent.

The beet sugar industry at Maffra needs a good deal of thought, energy, and loyalty. Granted such, it should be a success.

DENMARK'S BEST COW.

It will interest dairymen to learn that Denmark's best cow for last season yielded, during the year, 20,768 lbs. of milk, making 958 lbs. of butter. She is a big, well-developed cow of the Danish race of milkers, and weighed nearly 1,800 lbs. before her last calving.—*South African Dairyman,* January, 1922.

NHILL CROP AND FALLOW COMPETITIONS.

Report of the Judge, H. A. Mullett, B. Ag. Sc., Chief Field Officer, Victoria.

The Nhill Agricultural and Pastoral Society holds its annual crop and fallow competition for the purpose of improving the standard of farming in the district. The competitive spirit stimulates better workmanship, the discussion induced between farmers results in clearer thinking and greater receptivity of new ideas, and the critical examination and comparison of the various crops and methods by the judge lead to publicity being given to the best local practice. The nett result is progressive improvement.

Attractive farm residence and garden of Mrs. A. P. Dufty, Lorquon.

The present competition is the twenty-first organized by the society. No other society in the State has a record half so good. The improvement wrought has been substantial. To local farmers, however, it is likely to be less obvious than to those in a position to make comparison with other districts. In an area so extensive and so well farmed as is the Wimmera, it is difficult to make distinctions, but it can be stated without fear of contradiction that in the percentage of farmers who have adopted those practices which have been persistently advocated as fundamental for heavy crop production, Nhill leads the way. Nhill farming is good whether measured by the percentage of crop grown on land which is summer-fallowed, or by the thoroughness of the cultivation given the fallow, or by the extent of the use of improved seed wheat, or by the amount of seed and manure used per acre.

In the open section, this year, the crops placed first and second were grown on summer-fallowed land, as indeed were the bulk of the crops shown. Again, Mr. C. F. Reichelt, a competitor whose crop was grown

on winter-fallowed land, had practically lived on the fallow on which his crop was grown; it had been worked over in all thirteen times. The average quantity of seed used by the competitors in this section was 73½ lbs. per acre, with 96 lbs. of superphosphate. These quantities accord fairly closely with those demonstrated by the experiments conducted by the Department of Agriculture at the Longerenong College to be the most profitable. The thorough cultivation given by Mr. Reichelt meant that he had stored the maximum supplies of water in the fallow and created full supplies of plant food.

Mr. W. E. Dahlenburg is another who leaves no stone unturned in his efforts to grow heavy crops. Only 10.03 inches of rain were registered at this farm last year, yet the average yield obtained for 280 acres of wheat—some grown on refractory red land—was about 10 bags per acre. Thorough cultivation, liberal manuring, the use of best seed, &c., are responsible for the result.

Substantial farm residence of Mr. R. Blackwood, Kiata East.

Part of the crop was grown on summer-fallowed land and part on winter fallow. The summer fallow was worked over, including the original ploughing, on eleven occasions. The harrows were largely used. The crop was sown in June with a combined drill, 75 lbs. of seed with from 112 to 120 lbs. of superphosphate being used.

Besides improving the financial side of farming, the Society has endeavoured to build up a sentiment in favour of more comfortable living conditions on the farm, better farm environment, and greater pride in agriculture generally. In that, too, it is succeeding admirably with its farm competitions.

But the influence of the work is not confined to Nhill; it has spread elsewhere. Practically every Agricultural Society in the Wimmera now holds a crop and fallow competition, and the movement has extended to the Mallee, and latterly to the Goulburn Valley. This year twenty-one requests were made by Agricultural Societies for departmental officers. A few years ago there were only one or two Societies interested.

The Competition, 1922.

The autumn was dry, but there was a good spring. The rain, however, fell in a patchy manner. At Nhill, over 16 inches was received; at Salisbury, but 10 inches. The late frost on November 4th, which caught a good many paddocks of wheat in the flowering stage, reduced substantially the number of entries. But several who sustained heavy damage were not deterred from competing, a fact which speaks well for their sportsmanship. In all there were sixty entries in the eleven sections open for competition.

Frost so late in the year is a very rare occurrence. It damaged patches of crop on the low lying ground—that is, on the black flats between the red rises. Usually it extended some distance up any slopes facing the west. Heads were attacked irregularly. In severe cases the whole of the grain in the head had disappeared, but, generally, a portion was left unharmed. Examination proved that the flower in the frosted parts

Comfortable farm residence of Mr. Julius Reichelt, Lorquon.

had never opened. Possibly, in the undamaged parts of the head, the flower had been pollinated previously, or it may be that it had not yet formed. Any wheat which flowered earlier or later than the frost was quite undamaged. Interesting in this connexion were some patches of crop which escaped injury though surrounded by badly damaged plants. There were diagonal finishes in several paddocks that had been drilled round and round. The overlapping of the drill caused a double dressing of seed and manure. The extra manure had evidently resulted in the heads maturing sufficiently early to have escaped the frost. Classic instances of this were noticed in Mr. H. E. Dahlenburg's crop at Winiam East, and on the farm of Clarence Creek in the same locality.

The damage done to crops in the district was considerable, for the black flats generally grow the heaviest crops. The frosted heads looked quite normal at a few yards distance. They did not possess that blighted appearance commonly associated with frost. Close examination, however, showed that the damaged parts of the head were narrower and devoid of grain. In some instances up to 50 per cent.

Gathering at Farmers' Field Day.
Experimental plots conducted by Mr. W. E. Dahlenburg for the Department of Agriculture.

of the apparent yield of the crop was lost. The financial loss was therefore considerable, had the danger been realized at the time it would have been a simple procedure to have prevented damage by the use of "smudge" fires made from damp straw. The fact the flats are part of a well-defined valley formation would help to confine the smoke. The method, of course, would not be applicable to the Wimmera Plains generally.

Difficulty was experienced in estimating the yields of the crops, but a count of the percentage of damaged heads was made in each frosted paddock, and yields reduced accordingly.

Results—Section 1.

For the best half (not less than 75 acres) of wheat crop, Mr. Peter Bone, of Kiata East, was awarded first prize and 95 points; Mr. A. P. Koop was second with 91 points; Mr. R. Blackwood, 87 points, was next, and then follow Mr. C. F. Reichelt and Mr. W. E. Dahlenburg, with 85 points each. The winning crop comprised three varieties —Federation, Dollar, and Gallipoli. It was well headed, dense and level on top, all characteristics of heavy yield. There was some slight frosting. The Dollar and Federation were very true to type, but the Gallipoli was somewhat mixed. There was a little wild oats present, but no disease. The wheat was grown on summer fallow. This was ploughed dry in March, scarified in July, and then spring-toothed twice in the spring. In May, it was spring-toothed, and then sown with the combined drill at the end of May.

Seed at the rate of 75 lbs. per acre was used, with 95 lbs. of superphosphate. The soil was typical heavy black flat.

The second prize crop was Federation. The yield of the portion sown last was seriously reduced by frosting. It was an excellent field of wheat, and would otherwise quite possibly have won the competition. The wheat was reasonably true to type, quite free from weeds and any disease whatever. The paddock, black soil, was ploughed from 3 to 3½ inches deep in April, then scarified in July. In October it was worked over with the combined spring-tooth cultivator drill and then harrowed. In the following May it was re-worked with the drill and harrowed, then sown with the combined drill at the end of June and harrowed. From 70 to 80 lbs. per acre of seed was used, with 100 lbs. of superphosphate.

Pise house in course of construction (Mr. P. Koop's, Nhill).

Another fine crop was that of Mr. R. Blackwood, of Kiata East. Federation was again the variety exhibited. The wheat was very true to type, but frost had helped to reduce the yield slightly. The black flat upon which it was grown, prior to fallowing, had two crops of oats taken off in succession. It was summer-fallowed in April, ploughed early in August, with harrows attached, then scarified across the direction of the ploughing in the spring, then harrowed, and then in early November spring-toothed.

After harvest, a fortnight after the first rain, the fallow was re-worked with the spring-tooth and finally sown with the combined spring-tooth drill at the end of May and early in June. 75 lbs. of seed were used and 112 lbs. of superphosphate.

Mr. Reichelt's winter fallow was ploughed in June, and early in July, to a depth of from 3½ to 4 inches. It was then harrowed twice to cause wild oats to germinate. In August it was cultivated with the combined spring-tooth drill, and early in September crossed with the same implement. At the end of September the drill was again used. Then the roller was used on some clay banks. This was followed by a spring-tooth cultivating in October. After harvest, following the first rains, the paddock was spring-toothed on the 23rd April. It was again spring-toothed before being sown with the combined drill during the first week in July, using 75 lbs. of seed wheat and 100 lbs. of superphosphate. Two strokes of the harrows were then given. The crop was short-strawed, but very dense. It would have yielded very heavily, but was touched with frost.

Mr. Walter Dahlenburg's crop has previously been mentioned. Three varieties were sown—Crossbred 7063, Dollar and Federation.

The crops shown by Messrs. Landers and J. and T. W. Rintoule would have been exceptionally heavy but for bad frosting.

Details of Award—Section 1.—For Best Half (not less than 75 Acres) of Farmer's Wheat Crop:

Name.	Variety.	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points ..	..	**35**	**20**	**15**	**15**	**15**	**100**
P. Bone	Federation, Dollar, Gallipoli	35	17	13	15	15	95
A. P. Koop ..	Federation ..	29*	18	15	15	14	91
R. Blackwood ..	Federation ..	29	19	12	13	14	87
C. F. H. Reichelt ..	Federation, Huff's Imperial, Dollar	31	16	13	10	15	85
W. Dahlenburg ..	Crossbred 7063, Dollar, Federation	31	19	12	11	12	85
J. & T. W. Rintoule	Federation ..	23*	19	14	14	15	85
G. Landers ..	Dollar ..	27*	19	12	10	15	83

* Frosted crop.

Note.—The points for yield do not represent bushels per acre, but the differences between them do. The winning crop was heavier than 35 bushels per acre.

Results, Section 2.—Best 100 acres of wheat grown on Mallee land, Mallee fringe debarred.

There were four competitors in this section. The crop submitted by Mr. E. H. Rowe, of Propadollar, was placed first with 83 points. The varieties were Federation, Minister and Major. There were numerous strangers present, but the crop had no weed growth, and was quite free from disease.

The heaviest crop in the section was that of Mr. A. K. Mackenzie, which gained 82 marks and second place. This was a dense well-headed crop, but lost points on the score of disease. Mrs. D. R. Mackenzie's

paddock of Hard Federation looked well, but also lost points for the same reason.

The winning crop was grown on land most thoroughly cultivated and liberally seeded and manured. It was ploughed in July to 3 inches deep, harrowed twice, scarified in early spring, then worked twice with the spring-tooth attachment of the combined drill. After harvest it received a further cultivation with this implement following rain. It was sown by the combined drill at the end of June; 80 lbs. of seed were used with 90 lbs. of superphosphate. The soil is of a somewhat clayey nature for Mallee land. If anything the surface, which had run together, was reduced to a condition rather too fine for the class of soil.

Mr. R. Blackwood's crop of Penny Wheat at Kiata East.

Details of Award—Section 2.—Best 100 Acres of Wheat Grown on Mallee Land, Mallee Fringe Debarred.

Name.	Variety.	Yield.	Trueness to type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**
E. H. Rowe ..	Federation, Minister, Major	26	14	14	15	14	83
A. K. Mackenzie ..	Federation ..	30	18	11	8	15	82
Mrs. D. R. Mackenzie	Hard Federation ..	27	19	10	10	14	80
J. B. Marshall ..	Penny	22	18	13	11	13	77

Results—Section 3.—For best fallowed black land, not less than 100 acres.

Ten entries were received in this section. Without exception all were splendid examples of careful cultivation. Difficulty was experienced in separating the competitors, and finally resort had to be made

to small points of difference. The first prize was awarded to Mr. R. Blackwood, of Kiata East, who scored 98 points. Mr. H. E. Dahlenburg was second with 96. Highly commendable exhibits were submitted by Messrs. C. Reichelt, W. E. Dahlenburg, Alf. Schultz, Dufty and Garton, and Peter Bone. The remainder lost points through minor defects.

The winning paddock of summer fallow on a fine black flat, submitted by Mr. Robert Blackwood, was cultivated to a tilth like an onion bed. The bottom was thoroughly consolidated. There was an absence of weeds, and abundance of moisture had been conserved below. If anything the mulch was a shade shallow; it was about 2 inches deep. Last year the paddock was in oats which were cut for hay. The land was ploughed in February to 4 inches deep. Harrows were attached to the plough. In July half was scarified and half spring-toothed. Subsequently the scarified half was given two further scarifyings, as weeds appeared. The rest of the paddock was spring-toothed instead of being

Heavy Crop of Federation Wheat—Mr. P. Koop's, Nhill.

scarified, and finally the whole area worked over with a spring-tooth during the end of October. No distinction could be observed in the moisture content of the two sections, but the resultant crops may possibly show a difference. The early working no doubt contributed to the excellent condition and the high moisture content of the fallow.

Mr. H. E. Dahlenburg's fallow was an excellent piece of summer fallow on a black flat. The land was ploughed up out of grass, and in view of that, its condition was very meritorious. It was disc-ploughed to 4 inches deep at the end of March, scarified early in July, and harrowed. Subsequently it was scarified during the second week in August, harrowed twice, scarified at right angles early in October, and harrowed at the end of October.

Mr. Reichelt's fallow was also summer fallow, after wheat. The stubble was burnt and worked in quickly with the cultivator attachment of the combined drill, so as to incorporate the ashes before wind could disperse them. This was done in April. Then the paddock was again

worked with the combined drill in July, and subsequently harrowed twice in September, cultivated with a scarifier early in October, and finally worked with the drill again at the end of October. The result was an attractive fallow in which a few points were deducted because the "bottom" was left somewhat ridged, *i.e.*, the depth of the mulch was uneven.

Mr. W. E. Dahlenburg's paddock contained red patches. These had been handled with judgment.

Mr. C. F. H. Reichelt's crop af Federation Wheat.

Details of Award—Section 3.—For Best Fallowed Black Land (not less than 100 Acres).

Name.	——	Moisture.	Mulch.	Weeds.	Cultivation	Total.
Possible Points ..	.. ..	25	25	25	25	100
R. Blackwood ..	Kiata East ..	24	24	25	25	98
H. E. Dahlenburg ..	Winiam ..	24	25	23	24	96
C. Reichelt	Woorak West	23	23	25	24	95
W. E. Dahlenburg ..	Salisbury ..	24	23	24	24	95
Alf. Schultz	Woorak ..	24	23	24	23	94
Dufty & Garton ..	Lorquon ..	22	23	25	23	93
Peter Bone	Kiata East ..	23	23	22	22	90
J. & T. W. Rintoule ..	Nhill ..	22	21	25	21	89
F. A. Meagher ..	Nhill ..	22	22	21	23	88
Bryan Dufty ..	Lorquon ..	21	22	21	22	86

Results, Section 4.—Fallow on refractory red soil. Loams debarred.

There were only two competitors in this section. Both showed red land which had been worked with considerable judgmont. It is hoped that there will be a larger entry in this section in future, because it is the cultivation of this particular class of land that many are seeking

to improve. Mr. C. P. Dahlenburg was awarded 93 points and first prize; Mr. H. Reichelt was second with 91. The winning fallow showed a surface tilth which had not been reduced to too fine a condition. The clods were small and regularly disposed. A few points were deducted for the presence of a slight skin on the mulch. The moisture content was high, but not so good as that of Mr. Reichelt's fallow. The surface soil on the red clay land in this district is very shallow, and it is essential to plough it shallowly so as to preserve the mellow soil near the top. The paddock was ploughed very shallowly in July with harrows attached behind the plough. It is desirable to prevent this soil remaining in big clods and subsequently baking in the sun. Harrowing quickly after ploughing helps greatly. In August the harrows were put over the land, followed by a scarifier as weeds appeared toward the end of the month. The harrows were again used in September. In October part was scarified and part was worked over with the combined drill.

Mr. Reichelt's exhibit lost points because of the presence of some large sun-baked clods.

Details of Award—Section 4.—For Best Fallow on Red Soil (not less than 100 Acres). Loams Debarred.

Name.	District.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible Points	.. .. ..	**25**	**25**	**25**	**25**	**100**
C. P. Dahlenburg ..	Winiam East ..	23	22	25	23	93
H. Reichelt	Woorak West ..	25	20	22	24	91

Results, Section 5.—Highest aggregate award for fallowed black land, 1922, and wheat crop grown on fallow, 1923.

The fallows were judged this year. The results are appended. They were the same fallows entered for Section III.

Details of Award.—Fallow, 1922.

Name.	District.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible Points	.. .. ..	**25**	**25**	**25**	**25**	**100**
R. Blackwood	Kiata East ..	24	24	25	25	98
C. Reichelt	Woorak West ..	23	23	25	24	95
W. E. Dahlenburg ..	Salisbury ..	24	23	24	24	95
Alf. Schultz	Woorak ...	24	23	24	23	94
Dufty & Garton	Lorquon ..	22	23	25	23	93
Peter Bone	Kiata East ..	23	23	22	22	90
J. & T. W. Rintoule ..	Nhill	22	21	25	21	89
Bryan Dufty	Lorquon ..	21	22	21	22	86

Results, Section 8.—Highest aggregate for the whole crop and fallow for the period 1922-24.

Every acre of fallow on the farm is inspected. The competition is only partially completed. The fallow on Mr. Robert Blackwood's farm was judged most meritorious. Next was that of Mr. W. E. Dahlenburg.

Details of Award—Section 8.—Highest Aggregate for Whole of Fallow 1922; for Whole of Wheat Crop 1923; for Whole of the Fallow 1923; for Whole of the Wheat Crop 1924.

Name.	Moisture.	Mulch.	Weeds.	Consolidation.	Total, 1922.
Possible Points	**25**	**25**	**25**	**25**	**100**
R. Blackwood	24	24	25	23	96
W. E. Dahlenburg	24	23	23	23	93
H. E. Dahlenburg	23	24	23	23	93
Alf. Schultz	24	23	23	22	92
Peter Bone	22	22	22	22	88

Paddock of crossbred, 7063—Mr. W. E. Dahlenburg's, Salisbury.

Section 9.—Aggregate points for crop and fallow on stiff red land.

The competition, now in its second year, has been completed. The result is that Mr. C. P. Dahlenburg is first with a total of 164 marks. The other competitor withdrew. The winning crop was a very satisfactory one for the class of soil it was grown on.

Details of Award—Section 9.—For Fallow and Crop on Stiff Red Land. 75 Acres were Judged 1921. Crop on the 75 Acres Judged 1922.

Name	Crop, 1922.						Fallow 1921. Total.	Grand Total.
	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.		
Possible Points	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
C. P. Dahlenburg	23	18	10	13	13	77	87	164
Johann Reichelt	Withdrawn						86	

Results, Section 6.—Highest aggregate points for the whole of the wheat crop and fallow for the period 1921-1923.

The competition is only partially completed. A further series of crops have to be judged next year. Some competitors had to withdraw on account of badly frosted crops this year. The remainder are very evenly matched. Mr. R. Blackwood leads with 273 points, Mr. Peter Bone is next with 272, Mr. C. Reichelt next with 271, and Mr. W. E. Dahlenburg next with 269.

Heavy crop of oats—Messrs. J. and T. W. Rintoule's, Nhill.

Details of Award—Section 6.—Highest Aggregate for the Whole of the Fallowed Land 1921; the Wheat Crop 1922; the Fallowed Land 1922; the Wheat Crop 1923.

Name.	Whole of Wheat Crop, 1922.						Total Fallow, 1921.	Total Fallow, 1922.	Grand Total.
	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total Crop, 1922.			
Possible Points ..	35	20	15	15	15	100	100	100	300
R. Blackwood ..	31	17	11	11	12	82	95	96	273
Peter Bone ..	35	17	11	14	14	91	93	88	272
C. F. Reichelt ..	34	16	12	10	14	86	95	90	271
W. E. Dahlenburg	30	18	11	10	11	80	96	93	269
C. P. Dahlenburg	Withdrawn—frosted crop.								
H. E. Dahlenburg	,,		,,	,,					
H. W. Goodwin	,,		,,	,,					
J. Reichelt ..	,,		,,	,,					
O. H. Leinert ..	,,		,,	,,					

Results, Section 7.—For highest aggregate points for crop and fallow on red land.

The competition is only partly finished. The fallows exhibited are the same as those in Section 4.

Details of Award—Section 7.—For Highest Aggregate Points for Fallow on Red Soil, 1922; and for Crop on the Fallow, 1923.

Name.		Moisture.	Mulch.	Weeds.	Cultivation.	Total for Fallow, 1922.
Possible Points ..	.. .. ..	25	25	25	25	100
C. P. Dahlenburg ..	Winiam East ..	23	22	25	23	93
H. Reichelt ..	Woorak West ..	25	20	22	24	91

Section 10.—Competition for Returned Soldiers. Aggregate points for crop and fallow for two years.

There were eight competitors. The fallows were judged in 1921 and the crops last year. The highest aggregate of points was secured by Mr. E. H. Manyard, of Boyeo, Mr. E. V. Eastick was second with 173 points, and F. H. Eastick third with 172. The yields of several of the remaining crops were seriously interfered with by frost. Mr. W. F. Beacom's wheat, unfortunately, was not sown till August.

The winning crop of Federation was sown on virgin soil fallowed in June. It was harrowed, scarified in spring, spring-toothed, scarified in October and harrowed. After harvest it was scarified after rain, re-scarified as rubbish appeared, and sown with a combined cultivator drill in mid-June; 70 lbs. of seed and 90 lbs. of superphosphate were used. Frost had damaged it in parts.

Details of Award—Section 10.—For Returned Soldiers.

Prize for highest aggregate points for 75 acres fallowed 1921, and crop on fallow 1922.

Name.	Variety.	Yield.	Purity.	Absence of Weeds.	Absence of Disease.	Evenness.	Total for Crop, 1922.	Total for Fallow, 1921.	Grand Total.
Possible Points ..	.. .. ..	35	20	15	15	15	100	100	200
E. H. Manyard ..	Federation ..	29	19	12	15	14	89	85	174
H. V. Eastick ..	,, ..	30	16	10	14	13	83	90	173
F. H. Eastick ..	,, ..	24*	16	15	15	13	83	89	172
Clarence Creek ..	,, ..	21*	17	11	9	15	73	95	168
Gordon Bone ..	,, ..	17*	18	9	8	11	63	93	156
S. J. Smith	Federation, Minister	20*	15	9	10	11	65	85	150
S. Beacom	Federation ..	21	13	7	12	11	64	84	148
W. E. Beacom ..	Federation, Minister	9†	16	5	12	12	54	94	148

* Yield suffered severely from frost.
† This crop was sown in August.

Section 11.

Special Trophy Presented by Noske Bros. Pty. Ltd., for Fallowed Land, with the Object of Encouraging the Use of High-Strength Wheats.

There were seven entries. 50 acres of fallowed land had to be shown and subsequently sown with 25 acres of Minister wheat, and 25 acres of

Mechanical bag loader at Mr. H. Dahlenburg's, Winiam.

Neat method of stacking manure.

Hard Federation. In most instances the fallows exhibited were portions of those entered in Section 3, and have, therefore, been described. Mr. R. Blackwood gained 98 points and first place; Mr. Alf. Schultz was second with 97 points.

Section 11.—Special Trophy Given by Messrs. Noske Bros. Pty. Ltd., for Best 50 Acres of Fallowed Land, upon which 25 Acres each of Minister and Hard Federation Wheat are Grown.

Name.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible Points	25	25	25	25	100
R. Blackwood	24	24	25	25	98
Alf. Schultz	24	24	25	24	97
G. Batson, junr.	23	24	25	24	96
C. Reichelt	23	23	25	24	95
J. and T. W. Rintoule	22	21	25	21	89
F. A. Meagher, No. 1	22	23	21	23	89
F. A. Meagher, No. 2	23	21	22	22	88

In conclusion I desire to thank those members of the Society whose hospitality contributed much towards rendering the work of judging less arduous, and especially Mr. Chas. Towns, the secretary, for his help and consideration.

DIETETIC VALUE OF CHEESE.

Official experiments have settled the question of the digestibility of cheese. The chemists have concluded that both raw and cooked cheese are equally easy of digestion when eaten under right conditions. As cheese is a very compact or concentrated food, it is not acted on in the stomach but passed on to the intestines, where it is finally absorbed. It is this very quality of prolonged digestion that has made cheese noted for its "staying" powers, and so valued by both athlete and workman as a mid-day food.

In cheese we find proteid constituents, corresponding to eggs, meat and fish, which must be supplied with the bulk in which it is lacking in order to overcome a tendency to cause constipation. It should be used as a meat substitute rather than as an adjunct to a heavy meal, savouries, cheese custards, soups, Welsh rarebits, souffles or fondus offering almost unlimited combinations to the imaginative housewife. A green salad and graham or entire wheat meal bread, with a tart dessert and simple cakes are suitable accompaniments to a cheese dish.

In buying cheese as a meat substitute, food value should be considered rather than flavour.

There are certain times when cheese adds perfection to a meal—in fact, there are many who think that no matter how limited the dinner, cheese must never be omitted. Brillat-Savarin says that "a dinner without cheese is like a beautiful woman with but one eye."

STANDARD HERD TEST.

Report for Quarter Ended 1st December, 1922.

Hereunder are given the names, along with the respective records, of the successful cows of those which terminated their test during the second quarterly period of the current testing year. The list comprises 150 out of the total of 183 which completed the test.

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard Required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
Mrs. F. M. Akehurst, Tunstall	Jersey ..	2	Nil											
The Mrs. M. I. Alston Estate, Cobram	Jersey ..	1	1	Silver Bell of Kameruka ..	6038	8.3.22	273	20	6,520	6.06	395.41	250	450½	284, 383
W. K. Atkinson, Swan Hill	Shorthorn	2	2	Blanche Rose 10th	10392	26.1.22	273	30	10,617	3.74	397.07	250	452½	296, 402, 423, 405
				Pearl of Willow Park ..	10266	23.3.22	273	30	10,404	3·83	398·69	250	454½	328, 393
C. Bamford, Benalla	Ayrshire	6	6	Fuchsia of Medburn Grove ..	..	24.1.22	273	17	5,047	4·34	219·82	175	250¾	
				Moonlight of Medburn Grove	..	8.3.22	273	13½	5,030	4·03	202·71	175	231	
				Treasure of Medburn Grove ..	..	17.3.22	273	27	8,478	4·54	385·26	200	439¼	240
				Fun of Medburn Grove ..	..	19.3.22	273	16	5,916	3·80	224·59	175	256	
				Gaiety of Medburn Grove ..	8300	20.3.22	273	16	7,559	3·87	292·79	200	333¾	213
				Beauty of Medburn Grove ..	4858	23.3.22	273	15	7,727	4·33	335·22	250	382¼	261, 266
Mrs. Irene Beard, Outtrim	Jersey ..	2	2	Biddy of Kelburn	9639	1.2.22	273	21½	6,612	5·27	348·78	200	397¾	
				Garenne 3rd of Warenda ..	6140	9.2.22	273	18	5,890	5·57	327·81	250	373¾	219
Callery Brothers, Bannockburn	Ayrshire	3	3	Marjorie of Langley Park ..	2839	27.12.21	273	32½	9,836	4·10	403·12	250	459½	401, 441
				Bonnie Jean of Langley Park	3478	15.1.22	273	10	5,927	4·58	272·75	250	311	302, 322, 294
				Fairy Queen of Langley Park	8545	15.3.22	273	4	4,812	4·32	208·05	175	237½	

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
Dr. S. S. Cameron, Hawthorn	Jersey ..	1	1	Duke's Spark of Glen Iris ..	..	6.2.22	273	12	3,141	6·33	198·97	175	227	
R. C. Campbell, Clarendon, near Lal Lal	Jersey ..	1	Nil											
Mrs. M. E. Carroll, Tyntynder Central, near Swan Hill	Red Poll	1	1	Limerick	269A	9.1.22	273	14½	4,858	4·00	192·69	175	219½	
P. Chirnside, Oakleigh	Jersey ..	2	2	Werribee Northwood Madiera 6th	6540	12.1.22	273	21½	6,756	5·82	393·50	250	448½	426, 412
				Canary 4th of Lesterfield ..	..	17.3.22	273	13	4,521	6·07	274·49	175	313	
J. W. Cochrane, Moorabbin	Ayrshire	1	1	Queen of Golden Vein ..	8879	3.1.22	213†	22	6,609	3·81	251·82	250	287	
Cockbill and Gibbs, Tandraboo, near Lancefield	Ayrshire	4	2	Jennie of Burnside	8906	18.2.22	273	13½	4,878	4·52	220·39	200	251¼	
				Leila of Warrook	5173	25.2.22	273	8	6,435	4·55	293·04	250	334	287, 334, 334
W. J. Colman, Kerang	Jersey ..	3	3	Laurie 2nd of Roseneath ..	6095	18.2.22	249*	17	4,990	5·52	275·21	250	313¾	185, 268
				Starleigh's Princess of Clover Flat	6096	23.2.22	244*	27	7,093	5·17	367·06	250	418½	382
				Queen of Bellaire	9261	1.3.22	238*	15½	6,413	5·76	369·31	250	421	361
W. T. Cullen, Warrion	Ayrshire	2	Nil											

* Herd withdrawn before completion of the lactation. † Sold before completing full term.

Standard Herd Test—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard Required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
A. E. Denis, Swan Pool	Jersey ..	2	1	Royal Sun Ray	9710	27.1.22	273	21	6,427	4·47	287·05	250	327¼	339
Department of Agriculture, Burnley	Friesian	2	2	Dominion Belle Corona ..	369	18.1.22	252	4	10,518	3·21	337·75	250	385	305, 420, 400
				Dominion Proud Lassie ..	368	1.3.22	273	30½	11,336	3·42	387·14	250	441¼	343, 381, 334
Department of Agriculture, Werribee	Friesian	2	2	Victoria Dutch Wood ..	..	29.1.22	273	26½	8,301	3·73	309·81	175	353¼	
				Dominion Coringa ..	380	22.3.22	273	44½	14,334	3·38	484·03	250	551¾	481, 460, 499
	Red Poll	16	14	Birdseye	377C	29.12.21	273	8	6,357	4·95	314·55	250	358½	250, 341, 438, 486, 392, 360, 488, 459
				Netherlana	492D	14.1.22	273	23	9,060	4·16	377·03	250	430	186, 278, 402, 404, 346, 329, 300, 286
				Effrontery	295B	15.2.22	251*	16	4,076	4·67	180·58	175	205¾	
				War Bird	257A	21.2.22	273	18½	6,336	3·78	239·61	175	273¼	
				Chevron	242A	22.2.22	273	21	6,562	4·15	272·01	175	310	
				Tigra	324B	25.2.22	273	28½	7,767	3·92	304·72	175	347¼	
				Bahama	238A	4.3.22	273	20½	6,734	4.36	293·59	175	334¾	
				Three Castles	402C	7.3.22	273	16½	4,677	4·27	199·94	175	228	
				Sovereign	320B	10.3.22	273	19	6,830	4·42	301·55	200	343¾	263
				Banksia	376C	15.3.22	273	8	6,047	4·59	277·86	200	316¾	241
				La Marseillaise	394C	17.3.22	273	9	6,104	3·86	235·38	200	268½	251
				Beltana	239A	17.3.22	273	21	6,534	4·11	268·66	175	306¼	
				Victoria Velvet	7AA	18.3.22	273	20	6,134	4·20	263·73	175	300¾	
				War Wings	259A	19.3.22	273	26	8,660	3·91	338·89	200	386¼	289
C. Falkenberg, Elliminyt	Jersey ..	1	1	Trixie of Colac	4914	25.3.22	273	14½	4,867	5·56	270·83	250	308¾	182, 304, 301, 322

* Sold before completing full term.

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard Required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
Flack and Sewell, Berwick	Friesian	3	3	Domino Fobes of Yarrabrae ..	266	3.1.22	273	22	9,527	3·27	311·95	200	355¾	281
				Prim Patch of Yarrabrae ..	..	26.2.22	273	12	8,975	3·41	305·85	200	348¾	244
				Miss Muller 3rd of Berry ..	242	27.3.22	264	4	8,128	3·37	274·70	200	313¼	278
Mrs. M. and W. A. Francis, Kilcunda	Ayrshire	1	1	Duchess of Hillcrest ..	5139	26.2.22	273	13½	4,964	4·36	216·26	200	246½	230
Geelong Harbor Trust, Marshalltown	Ayrshire	11	11	Holly of Sparrovale ..	7310	2.1.22	273	18	5,446	3·47	188·95	175	215½	
				Janice of Sparrovale ..	7312	10.1.22	273	20	6,461	4·25	274·28	175	312¾	
				Beanie of Sparrovale ..	7308	20.1.22	273	26½	8,270	3·65	301·90	175	344¼	
				Primrose of Sparrovale ..	6359	8.2.22	270	22	6,868	4·62	317·47	250	362	199, 302
				Duchess of Sparrovale ..	3889	9.2.22	273	5½	7,184	3·77	270·94	250	309	261, 275, 297
				Gladys of Sparrovale ..	6355	13.2.22	273	14	5,173	4·41	227·90	200	260	278
				Hygeia of Sparrovale ..	7311	15.2.22	273	17	6,224	4·41	274·30	175	312¾	
				Belle of Sparrovale ..	3883	18.2.22	273	10½	6,903	4·63	318·97	250	363¾	242, 333, 287, 266
				Clover of Sparrovale ..	2872	24.2.22	273	15	8,200	5·22	428·24	250	488¼	252, 343, 362, 335, 391
				Gowan of Sparrovale ..	6356	10.3.22	273	13½	6,588	4·81	317·05	200	361½	
				Myrtle of Sparrovale ..	3905	20.3.22	273	5½	5,881	4·72	277·63	250	316½	236, 271
H. Gibson, Murraydale, near Swan Hill	Ayrshire	1	Nil											
R. Hall, Sale ..	Ayrshire	1	1	Veronica of Dunachton ..	6389	29.12.21	273	16	5,453	3·90	212·74	175	242¾	
Dr. and Mrs. E. J. Henderson, Wangaratta	Jersey ..	2	Nil											
W. Henderson, Grasmere	Ayrshire	3	1	Viola 2nd of Carrocoorte ..	9452	22.3.22	273	14½	4,744	4·36	206·95	175	236	

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
S. A. Johnson, Woodend	Ayrshire	1	1	Bountiful of La Motte ..	5253	3.2.22	273	24½	8,119	4·34	352·42	250	401¾	388, 332, 313
A. W. Jones, Whittington, near Geelong	Jersey ..	5	5	Lady Grey 11th of St. Albans	9432	18.1.22	273	19	5,867	5.47	321·10	200	366½	341
				Butter Queen 2nd of Meryula	9736	18.1.22	273	18½	4,826	5·64	272·41	200	310½	292
				Blanchette 3rd	3753	18.1.22	273	13½	6,515	5·52	359·61	250	410	296, 281, 397, 419, 346
				Mystery 22nd of Melrose ..	8422	21.2.22	273	16	4,702	6·92	325·36	..	371	
				Beauty of St. Albans ..	..	26.3.22	273	19	5,878	5·61	329·79	175	376	
	Friesian	4	4	Waituki Princess Abagail ..	1023	30.12.21	273	26½	9,000	3·39	305·41	200	348¾	272
				Cordyline Inka de Kol ..	..	28.1.22	273	30	10,153	3·94	400·81	200	457	282
				Bell of Craignell	1031	15.2.22	273	20½	7,406	3·71	274·67	200	313	294
				St. Alban's May Queen ..	1036	19.3.22	273	25	7,864	3·50	275·19	175	313¾	
A. Joshua, Berwick	Jersey ..	1	1	Melba of Hillcrest	..	1.3.22	273	18½	4,732	4·67	221·06	175	252	
Kerr Bros., Bacchus Marsh	Shorthorn	2	2	Morven Pansy 8th	..	2.3.22	273	16½	7,471	3·99	298·41	250	340¼	276
				Morven Pansy 7th	..	14.3.22	273	26	8,978	4·04	362·76	250	413½	360
A. Kirby, Daylesford	Ayrshire	2	2	Cissie of Wattlebank ..	9682	26.2.22	273	18½	5,893	4·28	251·96	175	287¼	
				Annie of Wattlebank ..	9681	1.3.22	273	20	5,954	4·46	265·28	175	302½	
P. H. Lawrence, Agnes	Jersey ..	2	2	Little Queen	5249	22.1.22	273	14½	6,160	5·28	325·46	250	371	359, 366, 468, 376, 432
				Tilly Lantry 2nd of Warenda	7198	5.3.22	273	9	4,454	5.71	254·26	250	290	295, 262

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard Required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
C. Lees, Lockington	Ayrshire	2	2	Sunny 2nd of Gleneira ..	3453	8.1.22	263	4	5,685	4·67	265·44	250	302¾	
				Nestle of Gleneira	6149	4.2.22	273	19	7,518	4·51	339·24	250	386¾	
Mrs. E. M. Lennie, Tongala	Jersey ..	5	5	Sweet Nell of Hillcrest ..	6019	27·12·21	273	31	9,767	5.17	504.64	250	575¼	303
				Primrose 2nd of Bonshaw ..	7102	1·1·22	273	11½	5,099	5.43	276.88	250	315¾	346, 310
				*Tulip 5th of Bonshaw ..	7104	23·1·22	273	32½	8,148	4.49	365.95	250	417¼	237, 235
				†Tulip 4th of Bonshaw ..	7103	3·2·22	273	12½	5,875	4·89	287.47	250	327¾	338, 324
				Phyllis of Hillcrest	6014	26·3·22	273	18½	5,920	4·38	259.25	250	295½	
Leongatha High School, Leongatha	Jersey ..	2	2	Alice	..	6.2.22	273	13½	4,895	5·98	292·53	250	333½	315, 308, 384
				Surprise	..	23.3.22	273	19½	5,598	6.06	339·20	250	386¾	304, 253, 354
H. Luxton, Whittlesea	Jersey ..	4	4	Letetia 2nd of Somerville ..	9416	30.11.21	273	17½	6,534	5·15	336·19	250	383¼	
				Audrey's Victress of Somerville	9411	16.1.22	273	11½	4,381	5·40	236·69	200	269¾	242
				Trinket of Banyule ..	9512	19.1.22	273	17	5,182	5·31	275·43	175	314	
				Lady Grey 16th	..	6.3.22	273	12½	4,079	5·88	239·88	175	273½	
C. G. Lyon and R. R. Kerr, Heidelberg	Jersey ..	4	4	Harp	5206	24.12.21	261‡	16½	5,234	5·35	279·90	250	319	288, 344, 460, 385
				Silvermine 20th of Banyule ..	7131	13.2.22	218§	21	6,232	5·67	354·54	250	404¼	371, 380
				Mezzo of Banyule	9496	23.2.22	273	10½	5,896	5·66	333·92	200	380¾	252
				Molly 4th of Banyule ..	4246	17.3.22	273	17	8,337	4·71	392·84	250	448	302, 393, 445, 422, 404
McFarlane Brothers, Bundoora	Ayrshire	5	4	Heather Belle of Ayrbrae ..	..	3.1.22	258	4	6,108	4·02	245·53	200	279¾	281
				Lady of Ayrbrae	7562	11.1.22	273	8½	4,490	4·18	187·62	175	214	
				Lassie of Ayrbrae	6641	22.1.22	273	9½	6,223	3·78	235·37	200	268¼	242
				Bud of Ayrbrae	7561	26.3.22	273	12½	4,669	4·11	191·79	175	218¾	

* Tested for the two previous lactations as Tulip 2nd of Bonshaw. † Tested for one lactation as Tulip of Bonshaw. ‡ Withdrawn before completing full term.
§ Died before completing term.

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard Required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
W. J. McKernan, Byrnside, near Tatura	Ayrshire	2	2	Duchess of Locheden ..	5437	9.1.22	273	8½	5,605	4·41	247·19	200	281¾	211
				Jessie of Willowvale ..	4647	8.2.22	273	17	6,082	4·71	286·16	250	326¼	254, 338
T. Mesley, Dalyston	Jersey ..	1	1	La Charme	5248	10.1.22	153*	28½	5,214	5·47	285·34	250	325¼	280, 438, 413,481
T. H. Payne, Kilmore	Red Poll	1	1	Woodburn Tartar	226AA	10.3.22	273	15	4,889	4·60	224·91	175	256½	
J. Phillips, Murraydale, near Swan Hill	Jersey ..	1	1	Carnation of Ferntree Vale ..	9637	26.12.21	273	16½	5,170	5·30	273·84	175	312¼	
F. Raggatt, Casterton	Jersey ..	3	3	Silvermine 3rd of Clover Flat	9646	18.3.22	273	13	4,787	4·76	227·81	200	259¾	
				Queen's Princess of Clover Flat	7447	18.3.22	273	21	7,152	4·52	323·14	200	368½	252
				Princess of Strathbon ..	..	25.3.22	273	11	4,444	4·79	212·92	175	242¾	
J. D. Read, Springhurst	Jersey ..	9	9	Cosmos of Springhurst ..	Not yet allotted	5.3.22	273	15½	4,228	6·19	261·74	175	298½	
				Boree of Springhurst ..	,,	8.3.22	273	20½	5,673	4·92	279·25	175	318¼	
				Bouvardia of Springhurst ..	,,	13.3.22	273	20½	5,235	4·66	243·89	175	278	
				Forget-me-not of Springhurst	,,	26.3.22	273	13	4,159	6·25	259·77	175	296¼	
				Alskye 2nd of Springhurst ..	,,	17.3.22	273	17½	4,181	6·11	255·34	175	291	
				Fern of Springhurst ..	,,	19.3.22	273	18½	5,039	5·51	277·69	175	316½	
				Tulip 2nd of Springhurst ..	,,	21.3.22	273	21	5,639	5·61	316·47	175	360¾	
				Clianthus of Springhurst ..	,,	25.3.22	273	15	4,288	6·13	262·96	175	299¾	
				Delphinium of Springhurst ..	,,	25.3.22	273	14	4,035	6·04	243·90	175	278	
Miss Bruce Reid, Bundoora	Jersey ..	6	1	Jubilee Red Rose	7346	23.1.22	273	22½	5,807	5.25	304·78	250	347½	298, 356

* Died before completing full term.

Standard Herd Test—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard Required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
C. J. Reid, Devenish	Jersey ..	1	Nil											
Miss S. L. Robinson, East Malvern	Jersey ..	2	1	Kyora's Defender's May 3rd..	7380	2.1.22	273	10	4,513	5·83	262·96	250	299¾	255, 212
J. H. Rogers, Yarraville	Ayrshire	1	1	Sadie of Burnside	2896	3.1.22	259*	10½	8,149	3·60	293·57	250	334¾	
G. Rowe, Kardella	Jersey ..	1	Nil											
S. Russell, Tongala	Friesian	1	1	Dimple of Craigneal ..	1070	17.12.21	273	20	8,767	3·55	311·48	175	355	
F. G. Sadler, Camperdown	Shorthorn	1	Nil											
Sadler Brothers, Noorat	Ayrshire	2	2	Thelma of View Point ..	4622	7.1.22	262*	15	7,983	3·88	309·76	250	353	299, 249
				Brilliant 2nd of Kilmarnock	5850	27.3.22	182*	17	5,149	4·32	222·56	200	253¾	282
A. H. S. Schier, Kernot	Ayrshire	10	4	Daisy Brown of Inverleigh ..	7708	2.1.21	273	15½	5,194	4·45	230·97	175	263¼	
				Zeta of Sunnyside	10324	1.2.22	273	14½	4,369	4·25	185·68	175	216¾	
				Bettsie of Inverleigh ..	10285	5.2.22	273	13	4,685	4·55	213·16	175	243	
				Prudence of Roxburgh ..	6331	11.2.22	273	25½	5,967	3·64	217·34	200	247¾	186
O. J. Syme, Macedon	Friesian	1	1	Bolobek Frieda	1116	17.3.22	273	27½	8,619	3.72	319.61	175	364¼	

* Withdrawn before completing full term.

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. Completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
W. Tendeson, Merrigum	Jersey ..	3	3	My Luck of Tarnpirr ..	..	14.2.22	273	18	5,924	5·80	343·87	175	392	494, 474, 376
				Lady Choice of Tarnpirr ..	5160	1.2.22	273	21	8,088	5·74	464·15	250	529¼	
				Guinea Gold of Brookside ..	9721	5.2.22	273	17	7,650	4·48	343·01	250	391	
J. H. Thorburn, Woodend North	Ayrshire	2	2	Oatland's Annie	6926	23.1.22	273	20½	5,947	4·80	285·54	200	325½	
				Oatland's Peg	6930	11.2.22	273	14½	4,554	4·41	200·83	200	229	
J. T. Tweddle, Sunbury	Friesian	1	1	Lady Pirie	..	4.1.22	273	25	10,192	3·26	332·46	200	379	
G. A. Waite, Werribee	Friesian	3	3	Pauline 2nd of Ashby ..	700	19.1.22	273	24	6,755	3·35	226·14	175	258	
				Halcote Ariadne	535	10.2.22	273	15½	5,350	3·69	197·60	175	225¼	
				Halcote Joan de Kol ..	578	28.2.22	273	17½	5,903	3·74	220·71	175	251½	
A. L. Walters, Little River	Jersey ..	1	1	Bonnie 2nd of Tarnpirr ..	7052	24.1.22	273	16	5,778	6·70	386·87	250	441	
Warrnambool High School, Warrnambool	Ayrshire	2	Nil	.. ..	..	..	..	..	..	..	..	..	..	
W. H. Waycotte, Seymour	Jersey	1	1	Lady Perfection	4555	7.3.22	273	23	7,216	5·88	423·99	250	483¼	222, 365
J. Wills, Bacchus Marsh	Friesian	2	2	Bolobek Joan	315	14.2.22	273	21	8,502	3·01	255·83	250	291¾	196
				Pomakaka Snowflake ..	1138	2.3.22	273	21	7,904	3·29	260·28	200	296¾	

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. Completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
W. Woodmason, Murrumbeena	Jersey	10	10	Jenny Lind 9th of Melrose ..	5543	13·1·22	273	18½	6,414	6·17	395·91	250	451¼	347, 391, 397, 424, 417
				Lady Elector 7th of Melrose	9891	14·1·22	273	16	4,832	5·56	268·77	200	306½	
				Daisy 14th of Melrose ..	..	27·1·22	273	16	4,651	5·99	278·56	175	317½	
				Graceful Duchess 19th of Melrose	7540	8·2·22	273	22½	6,800	6·44	438·21	250	499½	325, 404
				Laura 9th of Melrose ..	5551	13·2·22	273	19	6,715	6·05	406·36	250	463¼	343, 392, 365, 434, 409
				Jessie 20th of Melrose ..	7541	21·2·22	273	18	6,087	6·22	378·33	250	431¼	310, 391, 397
				Handsome Girl 10th of Melrose	..	25·2·22	273	16½	4,925	6·05	297·74	175	339½	
				Lassie Fowler 7th of Melrose ..	7542	1·3·22	273	24	7,953	6·11	486·27	250	554½	339, 368
				Edith 6th of Melrose ..	7539	6·3·22	273	20	7,187	5·99	430·44	250	490¾	333, 381
				Jessie 29th of Melrose ..	..	9·3·22	273	12	4,632	5·89	272·61	175	310¾	

PASSION FRUIT CULTURE IN VICTORIA.

(Continued from page 14.)

By J. Farrell, Orchard Supervisor.

VII.—Pruning.

In the past, little attention was given to pruning, but, from our present knowledge of the passion vine's requirements, its future scientific treatment in this respect, so that the best results may accrue from its cultivation, should be regarded as essential. The type of vine most amenable to pruning treatment is that illustrated in Fig. 6, Section A, but less favoured types are often improved by the same process. In pruning the young vine so that the required number of leaders may be obtained, the stronger branches should be cut back or suppressed, so as to flush the sap to the "crown" buds, with which the plant is usually abundantly supplied. By the proper manipulation of the growths from those buds, the fan or framework of the vine may be perfected as already described.

The passion vine being a gross feeder, grows rapidly; therefore, during its development as well as afterwards, the soil should be kept well worked, and liberally manured where necessary. Many passion plots have been slow in coming into full bearing because of the neglect of these essentials in their cultural management. The vine begins to produce fruit when two years old, but this does not retard its growth provided thorough soil cultivation be practised; in fact, precocious vines are preferable. Pruning during the first three or four years consists mainly in regulating and directing the leaders which afterwards produce numerous superfluous light laterals. If these be not removed at the pruning, their subsequent maintenance causes the plant to become somewhat devitalized, and consequently more easily defoliated by disease and frosts, particularly when cultivation, &c., is neglected. With proper care and attention the vine usually reaches its maximum of fruitfulness when about six years old, and the retention of the debilitated willowy growths appearing after that time especially causes the feeding roots to become sluggish and to eventually cease functioning. Then the death of the plant, from what was formerly regarded by most growers as the effect of some mysterious cause, ensues. The passion being an exotic, however, probably suffers also from other yet unknown disabilites. A much higher percentage of vines died in former years, in the manner explained, when pruning was omitted, than during recent times when pruning has been more generally practised, other conditions being equal. It is, consequently, generally conceded that in future pruning must be regarded as a prime factor in passion-growing.

Reducing the superstructure of a reasonably healthy vine by removing the numerous useless lateral growths stimulates root action, and the sap is flushed to the several selected points of vantage. A smaller number of laterals appear during the next period of growth, but, although less numerous, the fruits produced on these are invariably more luscious and of finer quality than those of an unpruned vine.

Fig. 11.—Trellis of passion vines showing method of pruning.

It should be generally understood that the passion, like the grape vine (*Vitis*), develops its fruit on the succulent laterals produced during the currency of the same season's growth, and that these laterals mostly come from leaf-buds on the previous year's wood. Most of the growers in the passion fruit districts, owing to their rather limited experience with the grape vine, are not thoroughly acquainted with its pruning needs, and are, therefore, somewhat slow in gaining a knowledge of the passion, which requires somewhat similar treatment in this regard.

During normal seasons and in suitable position, the matured foliage assists materially in protecting the leader wood and fruiting laterals from frost during winter; pruning, therefore, should not be commenced until the frosts are over. Fig. 11 shows a trellis of five vines eight years old, the one in the right of the picture pruned and the four on the other portion of the trellis unpruned.

The visitation of *gloeosporium*, in a most virulent form, which immediately followed the heavy rains experienced in February last year, destroyed a high percentage of the first crop then ripening, and caused the vines to become sparsely foliaged. The plants were unable to regain their normal condition during the remainder of the growing period, which was followed by unusually severe frosts and a heavy fall of snow. These cold conditions supervening on the *gloeosporium* effects were responsible for the almost complete defoliation of the vines in the different districts, the condition of the plants shown in the picture (Fig. 11) being typical of most of the passion plots. The winter of 1922 is now regarded as the most severe in the history of passion fruit culture in Victoria. There is no reason, however, for intending planters or others inexperienced in passion-growing to become dismayed, because severe winters are of rare occurrence, and even when badly "frosted" the vines, if carefully tended afterwards, quickly recouperate when the spring growth commences. The photograph, of which Fig. 11 is a reproduction, was taken in Mr. Maynard's orchard at Silvan on 12th October, 1922, and later on when these vines are in full foliage they will be again protographed and the reproduction made available for comparison with the illustration under review.

Prior to being treated, the pruned vine appearing in the illustration was covered with a dense mass of light willowy growths like those on the untreated ones on the other end of the trellis. Some of the twigs had been killed by frost, while others were still alive but without leaves. In pruning the established vine, all the sickly or dead laterals are severed, at or near their base, from the main branches and sub-leaders. This is to flush the sap to the basal buds so that they may give out shoots, which, during their period of growth and development, yield the fruit for that season. The healthier laterals may be shortened back or removed in like manner, according to the condition of their buds and that of those at the base; but, generally speaking, practically the whole of the laterals may be removed. Dead or diseased leaders should also be cut out and suitably placed young growths made to take up their places. The main arms as well as the smaller growths sometimes become badly "frosted" during severe winters and often even in mild winters when the vines are grown in unfavorable situations. When it is plain that a plant suffering in this way or affected by fungi will have great difficulty in recovering, the best remedy is, when pruning,

to cut all the leaders off at the crown. Then the latent crown buds will yield an ample supply of young growths with which a new fan may be constructed.

When pruning the vine was first adopted a long hook-shaped knife, or sometimes a hedge shears was employed to get over the work quickly, the mass of laterals being practically shorn off. Through knowledge gained by practical experience, however, the use of those implements has been abandoned in favour of the ordinary secateurs by which, though pruning becomes a slower process, the growths may be cut back more accurately and neatly to the desired nodes and bases. Apart from the advantages derived from treating vines in the manner explained, it may be further stated that pruning, to a great extent also, regulates the time of cropping. Unpruned vines blossom early and mature the first or heavy crop of the season, sometimes causing a glut and relatively low prices; whereas, pruned plants yield a later crop when higher prices are obtainable.

Fig. 12.—Single-furrow orchard plough of modern type.

VIII.—Soil Management.

The amount of cultivation needed by passion plots so that the best results may be obtained from same depends largely on the nature of the land and the weather conditions prevailing locally. Two ploughings a year are usually sufficient to keep the soil in a sufficiently loose state to enable cultivators and harrows to maintain its satisfactory condition of tilth. One ploughing to 6 or 8 inches deep, according to the depth of the surface soil, should be given as soon as possible after the first autumn rain. On this occasion the soil should be drawn towards the rows of vines on both sides, so that the furrows formed between the trellises and running with the fall of the land may carry away the surface water during winter. Where the soil is heavy and tenacious, it should not be further broken up by harrows but allowed to remain in the rough state to become aerated and pulverized by the influence of winter weather conditions. When with the arrival of spring the desired alteration in the soil has taken place and the land becomes sufficiently dry, it should be harrowed down prior to being ploughed again. On this occasion the furrow depressions should be filled in by drawing the soil away from the vines, thus restoring the level surface which existed prior to the autumn ploughing. The type of single-furrow plough, illustrated in Fig. 12, and mostly used in the orchards for ploughing near the trees to obviate digging the strips, has proved the most suitable for employment on the passion plot. Its shifting

handles and adjustable head-rack facilitate the working of the soil around the butts of the vines when ploughing either on or off.

No time should be lost after the spring ploughing in bringing the soil into a fine state of tilth to conserve the soil moisture for the vines during summer, as the more suitable passion soils part with their moisture quickly except intensive cultural measures are taken. For this work a nine-tine spring-tooth cultivator of the type shown in Fig. 13 is the most suitable implement, being preferable to the ordinary drag-harrow and disc cultivator. Here the cultivator is shown as running on the skid, but by the handle and rack adjustments the

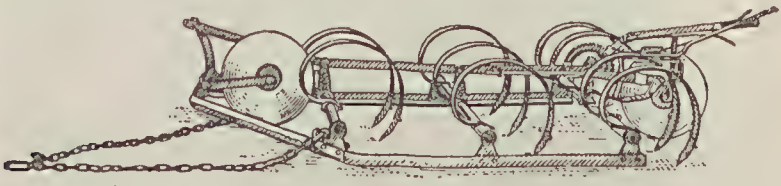

Fig. 13.—One-horse spring-tooth cultivator.

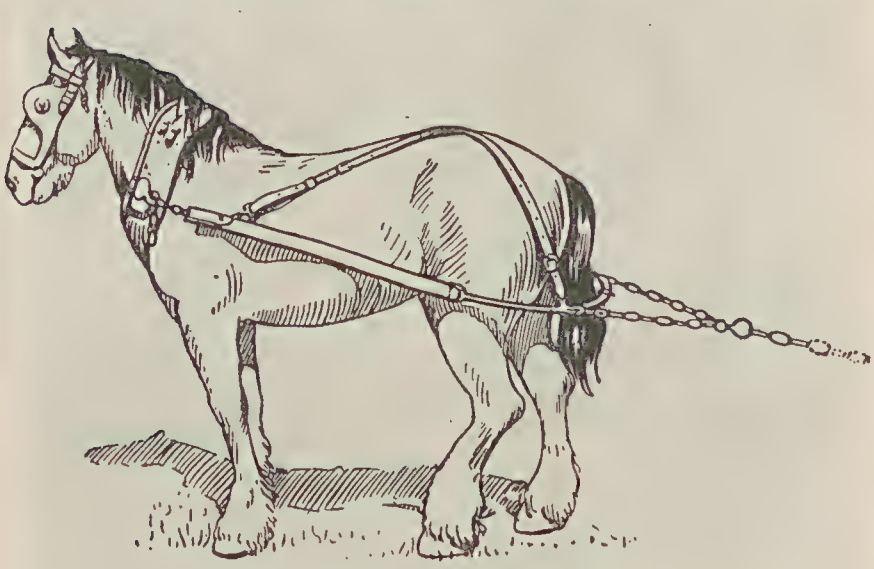

Fig. 14.—Modern orchard harness.

teeth may be lowered to work at the desired depth. The "spring-tooth" should be frequently used during summer and particularly after rains or irrigation. It often happens, however, that owing to pressure of work or lack of the necessary assistance, cultivation after rains has to be omitted; then the use of the disc cultivator becomes imperative.

Some of the more friable, red soils lend themselves to intensive cultural treatment even during winter, and when fairly rich and in nicely-sheltered warm positions, the passion shows its appreciation of these. This feature is more noticeable when the vines are growing on virgin soil than on previously cultivated land.

Fig. 15.—Planting passions among the strawberries.

When ploughing and cultivating, great care should be exercised not to damage the bark of the stems or branches of the vines with the implements, as the spores of fungi often find a lodgment in the wounded parts, sometimes causing the death of the plants. There are no cultivated orchard plants more easily injured than passion vines. They often suffer considerable damage by having branches broken and portions of the bark removed from their stems by the projecting ends of the old-fashioned swingle-bars and long trace chains still used by some growers. The chances of injury to the vines may be reduced to a minimum, however, by employing orchard harness of the type

Fig. 16.—Planting lemons among the passions.

appearing in Fig. 14. This is a relatively light harness, and the iron tube forming the bow, which takes the place of the objectionable swingle-bar, is held up by leather hip-straps, and the traces, being of leather also, there is no rough surface to come into contact with the vines. As the draught is adjustable from straight behind the horse when ploughing on or off, the bow does not chafe his legs.

The fact that the passion vine being a greedy feeder invariably responds well to good cultivation cannot be too frequently emphasized, as this phase of its culture is so often neglected. It should also be remembered that, as one-way working is imperative (cross-cultivation being precluded by the wires), and as the vine is an evergreen, the

soil should be at all seasons of the year kept in as perfect a state of cultivation as local conditions will permit. The vines, when left to their own resources or treated to shallow cultivation, become surface-rooted, producing a high percentage of their roots in the surface soil. Deep working, from 6 to 8 inches, according to the depth of the surface soil, so necessary for the passion plot, counteracts this objectionable condition, and trains the roots to function below the reach of cultivating implements. No crops of any kind, particularly cereals and cabbage, however well tended, should be grown among the vines. Not only do these crops deplete the soil of the vines' essential food, but they also monopolize the air spaces between the trellises to the detriment of the passions. Although this practice has demonstrated many undesirable results, there are growers who still persist in it, but there is evidence of its future discontinuance.

Old strawberry patches, as soon as the bushes cease to produce remunerative crops, are sometimes planted with passions. Fig. 15 shows Mr. Waring's passion plot at Silvan being extended in this manner. When the strawberries begin to "go off," the yearling vines are planted out and tied to stakes, as shown in the illustration, and usually the following year the trellises are erected. When the strawberries lose their commercial value they are ploughed in, and the land utilized solely for the passions. Likewise, when passions cease to yield payable crops through old age or other uncurable causes, they also are interplanted with other fruits. Fig. 16 shows this condition of affairs in Mr. R. Bowman's orchard at Silvan. Here rows of lemon trees are planted between the trellises, and the vines are being gradually removed. The arrow indicates the position from which one trellis has been taken. The land is good, and there is every indication of the citrus doing well.

(*To be continued.*)

THE MARKET FOR PASSION FRUIT PULP.

Passion fruit pulp is a commodity for which there seems to be a growing demand, both in America and London. A considerable quantity of pulp was sent to America last year—about £10,000 worth. This was forwarded in wooden casks, a certain proportion of sugar being added and the whole shipped at a low temperature direct. The price paid by the purchaser, it is understood, varied according to the quality from 1s. 3d. to 9d. per pound, and as 2½ lb. of passion fruit will make a pint of pulp the prices may be considered satisfactory.

The New South Wales Department of Agriculture has carried out a considerable amount of work in connexion with the best method of putting up the pulp, the method favoured being to pulp in cans and subject these to a heating process. It has been ascertained that to bring the pulp to a temperature of 190 degrees Fah. in a period of twenty minutes results in a very excellent article; but there is every reason to believe that the temperature can be reduced without any lengthening of the time, and further investigations under this and other headings are at present in progress.—*Agricultural Gazette* of New South Wales, December, 1922.

SUCCESSFUL DAIRY FARMING.

WHAT DOES IT MEAN?

By J. M. Kerr, Herd Registrar, Department of Agriculture.

The Attributes Required for Success.

It is only too true that popular opinion is prepared to count a dairy-farmer prosperous on no other evidence than that he pays his bills and is in occupation of a farm. The fact that men are dairymen only because they are willing to work unscheduled hours and may deny themselves more holidays than other workers is either overlooked altogether or is not regarded as affecting the question. A business cannot be held to be lucrative, or even remunerative, in which a man meets his liabilities only by working inordinate hours, or by foregoing the ordinary comforts of life which are the common lot in other callings equally open to him. Nor can one be said to be paying his way who finds it necessary to impose on special relationships for cheap labour services—a condition of affairs still common among dairy-farmers with families.

Many, mostly city people, cast longing eyes at the life on the land because they have noticed so many probate notices of farmers' wills running into four figures. It just shows how crudely opinions are arrived at; the amount of capital originally invested or the number of generations which might have been engaged are not regarded as material. No conclusion worth while can be come to unless a dairy-farm is considered as any other kind of business and the same tests applied. What, then, are the requirements with which a dairy-farm must comply before it may be deemed a successful business? The first cost which it must meet is interest at the current rate on the whole capital value of land, stock, and plant (for had the farmer merely lent this sum out in a gilt-edge security, he could obtain full interest without any labour). It must also return annually an additional sum equivalent to the yearly depreciation of buildings, fences, plant, and stock. Further, it must return a sum to meet all incidental expenses, including a proper wage to every hand engaged. Then the surplus by which the gross income exceeds the total of all this is what the farmer himself is receiving for risks, his managing ability, and his labour.

The dishonest farmer might be tempted to make his own salary a first claim on the revenue, enjoy himself, and put off his just liabilities as long as he is permitted, which is not likely to be very long. But all except an insignificant minority of farmers first pay all their just debts, recognising that only what is over is theirs by right. It might be only a bare three meals a day and a bed to lie on, or it might be a sum approaching the earnings of a farm produce merchant according to the qualifications of the man himself for the calling. There are hundreds of farmers, with all the necessary physical attributes, accepting half the wage now paid to hod-carriers and delivery carters. But such men certainly lack the initiative either to improve their methods or seek other fields, and their lot excites little public interest. The fact that there are dairy-farmers of the first generation whose farms return

them a good salary over all expenses shows that the opportunity is there for the right men, *i.e.*, the man with the qualifications.

Dairying is not, like the hod-carrier's, an unskilled occupation, but requires certain human attributes leaning as much to brain as muscle. In this regard dairying is, perhaps, the most complete form of agriculture, and also the most exacting. There need be no slack time such as there is in merely growing wheat or fruit. Even the Sabbath offers but little respite. It is hard indeed if, at the end of each year, a dairyman finds himself worse off financially than if he had been hod-carrying. Although it cannot be claimed that dairying is necessarily more remunerative than other branches of agriculture, considering the nature of the work it involves, it can most assuredly be claimed that it is safer. Its returns come early and at frequent intervals, each return eliminating some of the year's risk, thus commanding more credit for the owner. Its appeal is, consequently, more to the struggling than to the strongly-established land-owner. Entailing, as it does, more labour for a given return than other rural pursuits, the dairying industry feels more the general labourer's growing aversion to country occupations; but despite this relative disadvantage under which it has to labour, the man to whom it is congenial can make it at least as remunerative as any other agricultural vocation. It is not a life which every one would find congenial; in fact, it might be well to say at the outset that it is only the man of exceptional grit who wins eminent success at dairy-farming. If the successful dairy-farmer is not a type in himself, there are very many types which could never include him. Most men possessing a business sense, such as the progressive dairyman must have, are disinclined for the manual labour and seven-days-a-week attention which the calling involves. Be he ever so hard-headed and shrewedly-calculating, the beginner is not likely to enjoy much profit apart from his own pair of hands and rolled-up sleeves. Likewise, be he ever so industrious, he will soon find that the mere performance of work helps him little if it is not the right thing that is done. The attributes most likely to win success in dairy-farming are the same as make for commercial success everywhere, viz., zeal, industriousness, and business sagacity.

The dairy-farmer *par excellence* is he who, while lacking neither, possesses the first in sufficient measure to find all the recreation he seeks in some useful activity on the farm—that is, recreation in his vocation, or the delight of one's true calling. This is the particularly successful man occasionally pointed to as proof of "money in dairying." Such cases, of course, do not prove that dairying is lucrative for the mass any more than the more common failures prove that it is unprofitable. The human factor is all important. Enthusiasm is to be welcomed, but the enthusiasm of ignorance is not sufficient. It too often fizzles out when the real work is encountered.

Not every man who imagined that a bit of land and a few cows would "make him" for life finds it so when the opportunity has occurred. The glowing picture so commonly painted of the dairyman's life amounts to misrepresentation, which often serves to lead either mere hard-workers or comparative drones to attempt a life suitable only for men better furnished by nature. No man is safe in committing himself to the responsibility of a dairy-farm until he has first actually

engaged in its exacting duties for a period sufficient to test his mettle. Among the city born, the popular conception of the life is so different from the real thing that general advice to take it up cannot safely be indulged in. A period of probation, preferably as an employee, is a wise safeguard against disillusionment occurring when it is altogether too costly. Only by actual experience can a man prove the permanence or otherwise of the appeal the life—with its somewhat long hours, seven days a week, paid for by results—is making to him.

If the predilection survives this test, one great essential—zeal—is proved. With zeal, industriousness can generally be assumed, and these two together will insure that possessed intelligence will be applied. If possessed in sufficient degree the natural intelligence, or business sagacity may be calculated to protect him from the serious initial blunder of either buying too much or overpaying for his land; it will cause him to appreciate the value of efficiency in his every implement and animal to fulfil the purpose for which it is kept, especially the animals constituting his dairy herd; it will enable him to see the importance of seizing every opportunity, as it occurs, of furthering the operations of the farm, especially in the direction of providing economically an unfailing supply of fodder for his cows; it will teach him to recognise that money judiciously expended for soil repletion and on concentrates for his cows is "sprat" which catches the "mackerel"; it will prevent his failing to note the important bearing quality has on the selling price of his product; it will bring him early to learn that the only portion of the return from his cows which accrues to him is that which is surplus over feeding and labour costs; and it will not only help him to know all these and other facts innumerable, but it will make him wise enough to act upon them all. The wise farmer is generally a reader, and, by thus helping himself to the experiences of fellow farmers the wide world over, becomes so much better fitted to get the best out of his occupation.

The Amount of Capital Required.

It is, perhaps, needless to point out that to become a master dairyman some initial capital is indispensable. It is safe to say that success can be out of sacrifice only, if this be inadequate. With prices of all thing, as at present, in a state of flux it is impossible to say more than approximately what sum constitutes "adequate capital." Whatever sum is arrived at as being necessary would, in these times, be best regarded as the minimum. The first step is to try to estimate what sum will have to be paid for the land. Reasoning in the following way an approximation may be attained to. The acreage which will grow sufficient pasture to permanently provide body-maintenance of one average-sized bullock is worth at present produce values about £100 (providing it possesses reasonable marketing facilities); so that by dividing into 100 the acreage of grass land which will furnish a beast throughout the year something like the acre-value of the land can be arrived at. Thus, if it takes 2 acres of grass for each beast, the land is worth £50 per acre; if 4, £25; if 5, £20; and so on up to 8 acres per beast, beyond which it is no use continuing the method, because land of lower quality than 8 acres to the beast is next to hopeless for commercial dairying. When

the value of the total area has been thus arrived at, add on to it the utility value of existing dwelling, farm steading, and fences; or, in other words, all necessary improvements which contribute nothing to the land. The resulting sum will represent a safe price to pay for the farm, providing the purchaser has a certain cash or free credit fund of his own—the "adequate capital" previously mentioned.

The proportion this fund should bear to the whole liability is the next question. To illustrate, let us for simplicity sake take the minimum outlay likely to give a reasonable income to a man with average family obligations. Twelve cows is as many as one man can efficiently attend to, and we ought to be able to assume that what keeps a man fully occupied will also provide him with a fitting living. Now, on the basis above described it would take £1,200 worth of land to graze twelve cows, but that number of cows would permit time for cultivation, and as cultivation may generally be calculated to treble the carrying capacity of the portion so treated, the carrying capacity of the farm can be doubled so that half the area, or £600 worth of land, would suffice for the whole herd of twelve, with bull, horse, and a few young stock in addition. (This assumes that the owner will devote at least half the land to fodder crops, a proportion quite practicable on small farms.) No seller is likely to value even commonplace dwelling, steading, and subdivision fences at less than £500, which increases the sum to £1,100. The purchase of twelve good cows and a bull would account for about £200 more, making a total, so far, of £1,300. Horse, implements, and utensils are yet to be allowed for, so that the total capital value would easily amount to £1,500, which sum may be regarded as the minimum liability which the most humble dairy-farmer must incur in purchasing a farm. Now, cash being the only satisfactory payment for stock and plant, £400 would be required straightway for herd, horse, and plant. On the £1,100, which the farm is worth, he may be able to borrow anything from one-half to two-thirds, according to who the lender may be. Even if he is lucky enough to get a loan of two-thirds he still has to put up £366 of his own which, added to the £400 stock and plant cost, makes £766 the cash sum likely to be needed to successfully start a one-man dairy farm of twelve milking cows.

To show what average return per cow would be required to make such a farm "pay" the annual costs have first to be considered. Firstly, the land liability is £600. Those buildings among the steading which are particularly for dairying purposes would represent £200 of the building value allowed. There is £400 allowed towards horse, herd, and working plant, while debts incurred are those for seed grain, fertilizer, twine, freight, blacksmith's, saddler's, and other incidental charges which might be covered by £24 per year. Thus the sum locked up in land, dairy steading, stock, and plant (the value of the dwelling-house is omitted because man has a dwelling whether farming or not) is £1,200. This at 6 per cent. amounts to £72 or a first charge against each cow of £6 per year. Each cow must bear also her share of the £24 annual expenditure incidental to dairying operations—another £2. On most farms each animal will require £5 spent in purchasing concentrates for her proper feeding. Apart from labour the annual cost

of each dairy cow is thus £13. The difference between this £13 and the value of her gross production in the year, the farmer may regard as his wages per cow. A most indifferent labourer on a dairy farm to-day can command 35s. per week and his keep—equivalent to a salary of £130 per year; and as twelve cows would fully occupy him the rate of pay is nearly £11 per cow. If a farmer who has purchased right can obtain this amount per cow over the £13 for her keep (£24 gross), he is being rewarded on the same scale as a farm labourer. If he has no better qualifications than a farm labourer he is not being very much underpaid, but it is on his own intelligence, industriousness, and zeal that he must depend to better the relationship which his income per cow bears to the above sum (which represents a yield of, say, 260 lbs. butter fat and 585 gallons of skim milk). It takes fairly efficient management to get even this average return in a herd of cows, but, as there are in our own State of Victoria some cows giving over 600 lbs. of butter fat in the year, many which give over 500 lbs., and whole herds which exceed 400 lbs., the farmer is commercially blind who cannot see the easier avenue which selective breeding offers.

[The list of items in the above statement of revenue and expenditure does not include either the stock depreciation or the increase of progeny, because they are likely to about balance one another; both have been omitted for the purpose of simplification. Depreciation of plant is likewise likely to be fully covered by the enhancement a good cultivating farmer is able to effect by proper utilization of the manure from well-fed animals.]

The Class of Land for Dairying.

Success at dairy-farming being finally measured by the extent to which a man is able to make the returns exceed the cost of production, it is well not to make the initial mistake of selecting an unsuitable farm on which all one's earnings are absorbed in attempting to remedy the defects of nature.

Water on the Farm.

By nature the dairy cow is designed to consume large quantities of herbage, not merely nutritious, but succulent as well. There is more virtue in the greenness of vegetable fodder than has yet been discovered or realized. Where the greatest continuity of such fodder exists, there is the natural habitat of the species, and the more nearly the location conforms to these, her natural conditions, the more efficiently will the milking mechanism function. Such conditions constitute what is commonly called "dairying country," and cannot exist naturally apart from a copious rainfall, to be valued not so much by the number of inches as by its timeliness. In fact, all that portion of our farming land which is not popular for dairying is just so because it is either not sufficiently favoured with rain in the warm months—a condition which makes for lusciousness of pasture—or else its soil is of a nature unsuitable for retaining moisture. Not only is the quantity of the cow's output dependent on water, but the quality of the marketed product can never reach the high standard set by our competitors without a liberal use of water twice a day on the dairy utensils. Farm animals require a never-failing supply for drinking purposes and the more

tempting and conveniently available the better. One is fortunate if there be a running stream for the herd; if there is not, steps must be taken to provide a supply against all likely emergencies. Whatever the cost, neglect is likely to be more costly. If dams have to be resorted to the animals should not have direct access, but the water should be led into troughs for them—even if a windmill be necessary. It is possible in many localities to strike a suitable supply for drinking purposes by a bore or deep well, from which the water may be cheaply raised by wind power. Such a supply is none the worse for the animals by being slightly brackish. The domestic supply is best conserved in tanks supplied from the roof, preferably underground, for it is certainly a boon on a dairy farm to have a supply, both fresh and cool, at one's command.

There is no need to tell the milker of cows that milk production is a continuous process, but all do not seem to realize that there must be equal continuity of food supply. The cow's udder cannot work apart from her stomach, and as frequently as the produce is removed from the udder, so must the latter be replenished through the stomach.

Cultivation and Continuity of Food Supply.

Pasture is sufficient for this only temporarily, and it is but for a short period in each year that even the best pastures supply a good dairy cow with as much raw material as her system is capable of treating. If the best of land is short-coming in respect of milk-making food, how much more necessary will supplementary fodder be on land of poorer quality. It may be accepted as an axiom that on any farm where conservation of fodder is not practised the cows carried are either too poor or too few, and it may be taken as another axiom that every dairy farm so managed is proving a poor investment to its owner. Continuity of food supply is a present-day obligation. It can be assured on most farms only by cultivation, and the great virtue of which is that it enables one to do with less land, thus cutting down the initial outlay necessary. The area of land required for cultivation should not be deduced from the number of animals kept, but rather the number of stock should be subject to the area one is able to cultivate.

The answer to the question "How much should a dairy-farmer cultivate?" is "All that is practicable." But there is no virtue in increasing the area if it means poorer tillage. It is not good practice to stock up to such an extent that each year's fodder production is consumed in that year, neither is it wise either to relax one's efforts or to increase the herd just because, as the result of a particularly bounteous season, there happens to be an extra surplus of fodder on hand.

A year's food supply in reserve is never out of place; in fact, no owner of a herd is quite secure with less. It is for this reason that a silo is so valuable. A little light land on a farm may not matter much, but an undue proportion of poor land should never be purchased as a dairying proposition. Present-day costs prohibit its being improved sufficiently to meet the exacting needs of milking cows, which must obtain their full food requirements without excessive travelling; nor does it give either dry springing cows or young growing heifers justice.

It has been shown that, by a sound policy of cultivation and conservation, the area of land which will support the minimum number of cows necessary for a man's living can be considerably reduced. This means less initial outlay, thus increasing the annual profits to the extent of the sum saved in interest.

As land values are based on prospective profits, the dairyman who, after paying the current price for his farm, will not cultivate, need not be surprised if his uncultivated farm proves a poor business investment. It is the beginner with little capital who can least afford to neglect the only possibility of keeping the herd's yield up towards the maximum. Dairying is difficult enough with well-fed animals; with semi-starved ones it is hopeless.

There is no cheaper way of buying the roughage which dairy cows must have, than by good tillage with farm-yard manure, and superphosphate, if applied to the right class of land. Hence the necessity, in the first place, of ploughable land of a nature to hold out well against intermittent dry spells which can be expected even in the wettest districts.

Light-coloured shallow soils are not reliable crop-growers, even though mineral fertilizer be applied; they require a longer growing period, which means greater risk. Good crops are only possible on such soils with either early autumn or late spring rains—preferably both—a condition of affairs only occasionally granted. Lacking vegetable matter or humus in their composition, they set closely under rain and, consequently, bake quickly in its absence even in the warmth of spring. The summer sun sets them hard and the early seeding which, in their case, is so necessary is practicable only by fallow, which is "time off," and, consequently, relatively costly. As so much depends on food supply in dairying, the beginner would do well to leave land of this class to the orchardist or any one else who does not need to count the cost. Almost as disappointing is some of our light chocolate land possessing no water-holding sub-soil. They are invariably situated in localities of high rainfall, and are generally deficient in nitrogen, which is leeched out, in solution, through the porous sub-soil by the heavy rainfall as quickly as it assumes the essential nitrate form. The best land has, of course, already been taken up, and there is now but little possibility of acquiring a property possessing all the features which best adapt it for the dairy cow. In fact, to get land right in quality one must not be too insistent on the other natural advantages. Lack of natural shelter is a disadvantage, but it is a minor objection only, provided the quality of the land is suitable. Much of our best dairying land is exposed and somewhat bleak, but it is found that this is not too severe a handicap if its quality enables one to alleviate it by producing plenteous feed. Some reduction should, however, be made in the purchase price to permit the buyer mitigating the defect by planting shelter belts. In purchasing land for dairying, its marketing facilities must be considered, and although there are but few districts now from which produce cannot be conveniently marketed, any increased cost of marketing must detract to some extent from the value of the farm, and should be considered when purchasing.

(To be continued.)

EXPERIMENTS IN THE STORAGE OF FRUITS.

(*By D. B. Adam, B. Agr. Sc., Department of Agriculture.*)

In order to test the keeping qualities of different varieties of fruit grown under varying conditions, eight experimental chambers were built into one of the commercial chambers at the Government Cool Stores, Victoria Dock, Melbourne. These chambers were placed four on each side of a central passage occupying in all, approximately, 864 square feet of floor space, and were of the dimensions set out in Table I. following:—

TABLE I.—DIMENSIONS OF EXPERIMENTAL CHAMBERS.

—	Between Side Pipings.	From Passage Wall to Back Piping.	From Floor to Bottom of Air Ducts.
	ft. in.	ft. in.	ft. in.
No. 1	8 9	9 6	6 6
2	9 0	9 6	6 6
3	9 0	9 6	6 6
4	9 3	10 0	6 6
5	8 9	9 6	6 6
6	9 0	9 6	6 6
7	9 0	9 6	6 6
8	9 3	10 0	6 6

Passage ground floor, 36 inch x 4 inch.

Three chambers are fitted for the direct expansion system. This system requires coils of pipes arranged to a height of 6 feet along three walls. Through these pipes ammonia passes in expansion. Two chambers are fitted for the Circulating Air system. Cold air from the battery is driven into the chamber from a duct at the top of the chamber on one side. On the top of the other side of the chamber is a suction duct where the air is drawn off again. The amount of air passing in, and therefore the temperature, may be regulated by the use of two hinged-trap doors on the side of the inlet duct. Three chambers are fitted with a combination of the Direct Expansion and the Circulating Air system. Thus, there are two different systems of refrigeration under review—the Direct Expansion system, the Circulating Air system, as well as a combination of the two systems. The valves for the expansion pipes are situated in the passage; there they can be regulated to suit the varying adjustments necessary to maintain an even temperature.

The walls of the newly-built portion are insulated with buzzer shavings; that of the original chamber is insulated with pumice. This wall remains as the back wall of chambers 5, 6, 7, and 8, and the side wall of chambers 4 and 8, the passage wall to be regarded as the front of each chamber.

In regard to the experiments under review, three standards of temperature have been maintained, viz.:—32° F., 34° F., 37° F.

Of the three Direct Expansion system chambers mentioned above, one was maintained at 32° F., one at 34° F., and the other at 37° F.

With the Circulating Air system, one chamber was maintained at 34° F. and the other at 37° F. Again, of the three chambers with a combination of the two systems, one was maintained at 32° F., one at 34° F., and the other at 37° F. Temperatures were logged at hourly intervals right throughout the experiment by the engineering staff. The temperature of each chamber was taken by means of the Cambridge long-distance thermometer, which instrument is commercially recognised and used. The readings of the instrument were calibrated from a standard thermometer hung in the centre of the room about two feet from the bottom of the air ducts running along the ceiling.

The resistance of the "leads" may be varied so that the reading of the instrument in the engine room corresponds to that of the standard thermometer. A frequent check on the Cambridge thermometer was kept by the use of ordinary thermometers suspended in the room. Once properly calibrated, however, it gave reliable readings. The resistance coil was actually placed on the wall next to the passage and guarded by a shield, about and through which air could readily circulate. The chambers being small, the presence of a person in the room for even two minutes has a decided effect on the temperature, which, however, soon gets back to normal after the person's exit.

Humidity.

Humidity has been determined by the use of a sling psychrometer. This consists of a wet and dry bulb thermometer, mounted so that it may be whirled. The wet bulb thermometer is covered with a piece of silk, which is wetted prior to being whirled for twenty seconds, when readings of the two are taken. The process of whirling is continued until consistent consecutive readings are obtained.

Table II.—Showing Some Typical Readings of Psychrometer.

	Temperature.	Refrigerating System.	Percentage Relative Humidity.			
			1.	2.	3.	Average.
Chamber 1	32° F.	D.E. and A.C.	90	89	90	90
2	32° F.	D. Ex.	85	87	88	87
3	34° F.	D. Ex.	85	83	90	86
4	34° F.	A.C.	90	80	85	85
5	34° F.	D.E. and A.C.	90	70	85	82
6	37° F.	D.E. and A.C.	81	72	81	78
7	37° F.	D.E.	81	73	80	78
8	37° F.	A.C.	86	74	75	78

Examination of this table shows that the percentage of relative humidity is lower in the chambers maintained at the higher temperatures, but there is no significant difference as regards the different systems of refrigeration.

The keeping quality of fruit is dependent on a wide variety of conditions—the conditions of growth in the orchard; the degree of maturity at the time of picking; the methods of handling, packing, of forwarding, and placing in store (including the time occupied in

these operations); finally, the conditions in the cool store as to temperature, methods of cooling, &c., have their influence. A variety of fruits have been used in the course of the experiment.

An analysis of the conditions under which losses occurred, together with their probable causes, has been attempted. It is by consideration of, and deduction from such analyses that the best methods of picking, packing, and storing will probably be evolved.

EXPERIMENTS WITH PEARS.

Losses in the storage of fruit may be broadly divided into two main classes—(1) Physiological changes, which include abnormal conditions not known to be due to organisms, and which operate in a way to render the product less valuable for man's purposes; (2) Changes in which a definite causative organism may be found. Two conditions of the former class have been investigated.

Physiological Changes.

The "Blackening of Skin" in Pears.

This is a surface trouble which affects most varieties. Some varieties are apparently more "susceptible" than others. The condition develops rapidly after the removal of fruit from storage, and has given rise to the impression that the effect of bringing them into a higher temperature after some period at low temperature is the direct cause. The trouble, however, is found in store. Some well-grown Keiffer pears, just commencing to ripen, from 16-year-old trees, and handled with great care, were placed in the chambers on 5th April—two cases in each chamber, one case wrapped, the other unwrapped. On 24th July these were all examined, and the extent of "blackening" classified as trace, medium or bad, according to its extent. The examination took place immediately after removal from store, and the results are set out in Table III.

Table III.

Chamber No.	Temperature.	Sound.	Slight.	Medium.	Very bad.	Moulds.
8 Unwrapped ..	37° F.	0	23	38	78	0
8 Wrapped	..	1	5	10	175	0
7 Unwrapped ..	37° F.	2	9	19	130	8
7 Wrapped	..	3	1	2	140	3
6 Unwrapped ..	37° F.	12	16	17	61	9
6 Wrapped	..	1	1	2	152	0
5 Unwrapped ..	34° F.	131	28	2	0	3
5 Wrapped	..	147	0	0	0	..
4 and 3	34° F.	All sound	..	..	..	..
2 and 1	32° F.	All sound	..	..	..	..

Three cases which had been stored at the three different standard temperatures were sent to the Western Market for sale, but within 24 hours, and before sale had been effected, the two which had been stored at 34° F. and 37° F. had turned black; that stored at 32° F. remaining sound and saleable.

On 6th September, 1922, some Keiffers from a neighbouring orchard which had been picked greener, remained "black-free" long enough to be sold, although the Keiffers, from the same lot as the three samples above referred to and stored in the same chamber were all black and could not be sold.

Wrapping has little, if any, effect on the development of "blackening." It was noted that the pressure of a piece of wood or even the finger was sufficient to produce a brown mark after a short time. Letters or figures may be traced with the lightest rub; in a quarter of an hour they stand out on bold black outline.

Thus—

(1) The degree of blackening is definitely a function of temperature; in a definite space of time at a higher temperature blackening is more severe than at a low temperature.

(2) The more mature the Keiffer is when picked, the earlier will it blacken.

The Cause of Blackening.

The leaves of deciduous fruit-trees in the autumn take on a variety of colours as a natural process in their life history. Some of these colours are derived from glucosides. Bourquelot and Fichtenholz* have isolated a substance, arbutin, a phenol glucoside from the leaves of many varieties of pears. They have also found it in the surface layer of the fruit of some varieties of pears. It is suggested that the blackening of pears in store is the result of the operation of the following system:—

$$\text{Arbutin} \xrightarrow{\text{hydrolysis}} \begin{cases}\text{hydroquinone}\\ \text{glucose}\end{cases} \xrightarrow{\text{oxidation}} \begin{cases}\text{quinone}\\ \text{water}\end{cases}$$

It would seem that arbutin and an hydrolytic enzyme exist side by side, glucose being split off and used in respiration. That the cells must be injured in order to produce blackening suggests that the oxidase system or portion thereof is held in a neighbouring cell.

Attempts by Bourquelot's method to isolate arbutin from Keiffer pears, which had been in storage for some months, though were not blackened, were not successful. Possibly the arbutin, if ever present, had been converted to hydroquinone, and had not had further opportunity to be oxidised owing to the non-injury of the cells containing the oxidose system and the hydroquinone. This theory is supported by the fact that any exposed peelings, if not quickly put into the alcohol, turned black at its edges. Further attempts to isolate arbutin will be made this season with fresh material.

Recommendations.

1. Pick Keiffer pears when fully developed but green. This will lessen the blackening: further, the stone cells are then less well developed, an objectionable feature when this pear is allowed to mature fairly well on the tree.

2. Store at as low a temperature as is possible—30-31 deg. F. is probably as low as is practicable, certainly as low as is desirable.

*. *Jour. Pharm. Chem.*, Vol. II., pp. 97–104.

Just as Bourquelot could not find arbutin in the outer layer of all pears, so we find that certain varieties do not "blacken" perceptibly in storage. There are gradations in the amount of "blackening." Of pears in the experimental chamber the variety Keiffer was by far the worst, followed by L'Inconnu, Madame Cole, Vicar of Winkfield, Beurre Bosc, which all commenced to show "blackening" after 1st September. Winter Cole, Josephine de Malines, Winter Nelis, did not show any signs of "blackening," the former till September, the latter two till November, at which times they were sold.

Flesh Collapse.

This is a complete collapse of areas of cells of the flesh, attended with more or less browning of the flesh. It is common both with pears and apples, and will be discussed more fully when the experiments with apples are being dealt with.

(1) Some varieties are more susceptible than others. Winter Coles are limited in their storage life on account of flesh collapse. July 1st is probably the commercial limit of storage at 32° F. for this variety on this account.

(2) Pears off young trees collapse from the centre. One three-case lot of Packham's Triumph pears from Drouin, of large size, and from four-year grafts, was examined on 8th July, 1922, and although green and firm outside, the pears were all found to have softened inside.

Decay Due to Organism.

With most varieties of pears this is the more serious type of loss. For the majority of fungi to gain entrance there must be an injury to the fruit. Thus the amount of loss due to decay organisms reflects the efficiency of the mode of, and the care used, in handling the fruit.

The main factors determining the amount of this loss are:—

(1) The variety of fruit and growth conditions in the orchard.
(2) Its maturity.
(3) Its handling during picking, packing, and storage.

The main causative organisms found were *Penicilliums sps.*, of these *P. glaucum* (Link) is the most prevalent. Besides these *Sclerotinia fructigena* (Pers.) Schr. and *Botrytis cinerea* (Pers.) have been identified. In storage this latter species tends to propagate vegetatively, the mycelium forming a "nest" of rotten pears. The stalks of pears are frequently infected first, and mould may spread down infecting the end of the fruit.

Results of Examination of Pears Stored Under Different Systems of Refrigeration and of Temperature.

(1) Winter Cole pears, put into store 25th March, examined 7th July, 1922—

(*a*) Average percentage sound—
At 32° F., 67%; at 34° F., 70%; at 37° F., 53%.

(*b*) Average percentage sound—
Under direct expansion system 70%; air circulation system, 60%; combined systems, 56%.

However, in the figures given, variations of figures in the actual counts at the different temperatures and within the systems enumerated, are as great as the average differences between the different sets of figures.

(2) Winter Nelis pears, Doncaster District.

Table IV.—(*a*) A Comparison of Wrapping Every Layer, Each Alternate Layer, and Unwrapped Pears Under Three Different Systems of Refrigeration all at 34° F.

—	Sound.	Mould.	Sound.	Grade.
			per cent.	inch.
Chamber 4—Air Circulation—				
Every layer wrapped	143	20	87	2½
Alternate layer wrapped	118	56	68	2¾
Unwrapped	139	72	69	2½
Chamber 3—Direct and Expansion—				
Every layer wrapped	132	24	84	2½
Alternate layer wrapped	97	40	70	2¾
Unwrapped	88	39	69	2¾
Chamber 5—D.E. and Air Circulation—				
Every layer wrapped	125	21	86	2½
Unwrapped	90	48	65	2¾

A consideration of the table shows:—(*a*) The value of wrapping; to be effective every layer should be wrapped. (*b*) No difference in percentage of mouldy fruit under the different systems of refrigeration.

The effect of irrigation on storage capacity was investigated.

Table V.—Pears from Irrigated and Unirrigated Plots Stored at 34° F., with the Direct Expansion and Air Circulation Systems Combined.

—	Sound.	Mould.	Sound.	Grade.
			per cent.	inch.
Irrigated—				
Wrapped	196	5	97	2¼
Unwrapped	156	37	80	2¼
Unirrigated—				
Wrapped	125	21	86	2½
Unwrapped	90	48	65	2½

Note.—Fruit from one orchard at Doncaster. Irrigation date about a fortnight before picking.

This table shows that Winter Nelis pears from an irrigated orchard keep as well as fruit from an unirrigated orchard. Large fruit, both on account of its greater size, involving possible constitution as well as sheer weight, and less numbers in a box will show a greater percentage of loss, due to mould (*see later*). Temperature has a decided effect on the prevalence of mould. The result of storage at different temperatures is given below.

Table VI.—Winter Nelis Pears under Different Conditions of Temperature.

—	Temperature	Sound.	Mould.	Flesh Collapse.	Sound.	Remarks.
					per cent.	
Chamber 1 (*a*)	At 32° F.	103	15	12	90	2½ inches, all fruit wrapped
2 (*a*)	At 32° F.	103	12	5	90	2½ inches, alternate layers wrapped
3 (*a*)	At 34° F.	106	39	1	70	2½ inches, all wrapped
3 (*b*)	..	106	34	..	74	Average from Table IV.
4 (*a*)	At 34° F.	57	48	5	46	Half-case, 2¼ inches, very badly handled, unwrapped
4 (*b*)	..	133	49	..	74	Average from Table IV.
5 (*a*)	At 34° F.	92	50	5	65	2½ inches, unwrapped
5 (*b*)	..	108	35	..	75	Average from Table IV.
6 (*b*)	At 37° F.	119	25	..	82	2½ inches, alternate, wrapped

(*a*) Sample fruit from north, Beechworth. (*b*) Sample fruit from south, Doncaster.

From this table it will be seen that the average percentage of mould at different temperatures is at 32° F.—90%; at 34° F.—67.5%; at 37° F.—82%.

Unfortunately the experiment in chamber 6 (*b*) included only one case; there, however, is definitely less mould at 32° F. than at 34° F.

Note larger percentage of "Collapsed" pears at the lower temperature (*see later* under Apples).

Abstracting from Tables 5 and 6, fruits similarly treated as regards wrapping, but of different grade, and excluding any known to be abnormally treated, *e.g.*, (*a*) table 6, we find that of grade 2¼, 88%; of grade 2½, 75%; of grade 2¾, 68%, are sound respectively. An interesting illustration of the amount of care and thought necessary for good results was provided quite accidentally with Winter Nelis pears.

One case shows (*a*) the amount of damage done by walking over cases while being stacked (one foot being placed on a half flat case); (*b*) the effect of too tight packing in one half of a case, and then nailing the lid on tightly.

Table VII.

—	Sound.	Mould.	Sound.
			per cent.
(*a*) sound half	57	12	82
damaged half	35	39	47
(*b*) sound half	10	40	80
damaged half	21	35	62

Both of which examples demonstrate the great care necessary in all the periods of handling to get good results.

General Notes on the Keeping Qualities of Pears Stored in Experimental Chambers.

These notes, of course, apply only to fruit held this season, and generally only refer to a small consignment from one district.

The districts from which consignments were drawn are shown in brackets.

"Commercial life" means estimated life under commercial conditions at 32°-34° F.

1. Glou Morceau (Harcourt) from trees 24 years old, fairly large, picked when green, but fully grown; wrapped; sound from 6/4/22 till 1/8/22, which probably represents the "commercial life" of this pear in cool storage; remains firm and free from "blackening."

2. Josephine (various). A good keeping variety. Tends to wilt, especially if picked early, when it wilts badly. When picked too early also seems to develop astringency. Apparently the disappearance of tannic principles in cold storage does not continue to the same extent as it does on the tree. October to November is the limit of commercial life of this variety in storage. These pears may be kept longer in storage, but if they are, they rapidly deteriorate on removal. The flavour is well retained throughout. This variety should be picked just before turning yellow, and stored as quickly as possible. Does not "blacken."

3. Keiffer (various). A firm pear; if picked green gradually develops a beautiful yellow colour; no wilting; mould losses small; "blackening," however, very bad, and as seen before, this limits its storage life. Under some conditions, such as fairly early picking, low storage temperature, "blackening" is retarded, so that by studying these, the "life" in store may be extended. July to September represented commercial limits of fruit actually stored at 32° F. in the chambers.

4. L'Inconnu (Harcourt), very sound; picked green; tends to "blacken", this "blackening" develops slightly in cold storage after 1st October; free from mould losses. The life of this pear in storage will be determined by the same considerations that govern the storage life of Kieffer pears.

5. Madame Cole (Tunstall). A very firm pear; stores well; shows a tendency to blacken after 1st October, but not nearly so bad as the varieties Kieffer, or L'Inconnu. September 1st, probably the limit of time for successful storage for this variety. Little loss due to moulds.

6. Marie Louise (Geelong). A more delicate pear, consequently the main cause of loss is moulds; does not show "blackening." August 1st is the latest date that this variety should be held for local commercial purposes; the condition is then firm; flavour well retained and juicy; does not wilt.

7. Vicar of Winkfield (Geelong). A firm pear that stores well. The mould growth on stalk tends to infect the stalk end of the fruit; after the beginning November begins to "blacken." September 1st advisable limit of storage life; flavour good, and does not wilt.

8. Winter Cole (various). Tends to become soft and mushy on storage; the chief cause of loss is moulds; some flesh collapse, together with small amount of wilting. No "blackening" developed while in store; the safe commercial limit of life in stores about 20th June.

9. Winter Nelis (various). A firm pear; the main cause of deterioration is mould; little or no wilt; flavour fairly good, but not juicy; it does not "blacken." Commercial life extends to 1st September if, as with all other varieties of fruit, it receives reasonably good handling. In store it may be kept till November.

SUMMARY.

1. An analysis of the losses and their causes with different varieties has been attempted.

2. The causes of loss have been classified as—

(*a*) Physiological: *e.g.*, "blackening" of Kieffer pears.

(*b*) Due to definite causative organisms, chiefly mould fungi; shown by the losses in Winter Nelis pears.

3. The operation of the arbutin-hydroquinone-quinone system has been suggested as the cause of blackening.

4. The effects of growth conditions, of wrapping, of temperatures, of systems of refrigeration, of care in handling, have been considered in relation to the keeping quality of pears.

5. Some notes about each variety, their keeping qualities, and commercial storage "life" have been added.

[In a later issue a report on experiments in the storage of apples will be published.]

WEEDS AND THEIR ERADICATION.

(Continued from p. 109.)

By H. W. Davey, F.E.S., Orchard Supervision Branch, Department of Agriculture.

Flax-leaved Fleabane—*Erigeron linifolius*, Willd. Family : *Compositæ.*

This exceedingly common weed of waste lands and edges of footpaths comes from the Mediterranean region.

It is a coarse, greyish-green annual, with erect stems, that may be simple or branching, the leaves are long and narrow, those towards the top of the plant becoming linear, the small teeth present on edges of the lower leaves being absent (Fig. 57).

The flowers are numerous, of a pale-yellowish colour, and produce an enormous number of seeds, capable of being carried to and fro by the wind.

This plant can be easily hand-pulled, or it may be kept mown closely to the ground. Spraying with arsenical preparations could be effectively applied when this weed is plentiful on waste lands, railway yards, &c.

Sheep Burr, or Bidgee Widgee—*Acæna sanguisorbæ*, Vahl. Family *Rosaceæ.*

This pest of grazing lands is a native of Australia, and is well known to everybody, especially so at this time of the year, by reason of its hooked seeds, attaching themselves to the clothing of any person incautious enough to walk into their midst.

Fig. 57.—Flax-leaved Fleabane (*Erigeron linifolius*, Willd.)

This Bidgee burr (Fig. 58), when young, is eaten by sheep, and they should be of assistance in holding the weed in check.

To prevent these plants from seeding, they could either be mown or dug out, but as they usually occupy very large areas, to do this would be a very costly matter. An effective method would be to

Fig. 58.—Sheep Burr or Bidgee Widgee (*Acæna sanguisorbæ*, Vahl.)

spray the plant with a weak arsenical spray during its flowering time in spring, or to apply salt to the infested areas. If an arsenical spray were used, it would necessitate the removal of stock from the land so treated until after heavy rains had fallen.

Many people have noticed that this plant is frequently attacked by a small metallic-blue beetle, having large swollen femora. These beetles

belong to the family *Chrysomelidæ*, genus *Arsipoda* of the *Halticides*, and this is of interest at the present time, when there are so many people of the opinion that beetles or other insects could be imported for the purpose of controlling St. John's wort—a plant that has taken possession of such immense stretches of country in Victoria.

In the case of the Bidgee burr, both the beetle and its host are indigenous to Australia, and although the beetle is often extremely plentiful, so, unfortunately, is also the burr.

It might be said that this beetle, being a native insect, is kept in check by its natural enemies, which, while being perfectly true, applies equally so to the burr, and so the balance of nature is maintained, both species existing in about the same proportion year after year.

Now, although the abundance of this burr must always ensure a plentiful food supply for the beetle, the latter may often be found feeding on other plants, many of which are introduced species. This appears to show that this beetle (like so many other of our native insects) is enlarging its range of host plants; this, in spite of the fact that its natural food plant remains abundant. Probably, a much quicker change to other food plants would take place if through cultivation or other causes great destruction of this burr occurred.

The great danger of insects acquiring fresh tastes as regards their food would always be present in imported insects, and in the case of phytophagus ones, introduced free of control, an acquired change of diet might easily mean disaster for Victoria, or even Australia.

If it were possible for such an insect or insects to succeed in exterminating the plant for which purpose they were introduced, it would probably then be found that they had already discovered other plants suitable to them for carrying on the species, and it is most unlikely that they would obligingly die out, as so many people appear to expect of them.

(*To be continued.*)

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

Green Manures.

If a cover crop of leguminous plants is required for green manuring a start at planting may now be made. This can be done only when all the fruit has been gathered from the trees. An early crop is a distinct advantage. The cover crop should make a good growth before the winter sets in, as the plants make very little headway in the cold weather, and they require to be ploughed in as soon as the ground is dry enough in early spring. It will thus be seen that it is necessary to get a good autumn growth, as dense as possible, and one which will adequately cover the surface before winter.

Cultivation.

Should the weather remain hot and dry it will be very necessary to give the land surface a good stirring, so as to conserve water supplies. Where fruit crops have been gathered a start may be made late in

the month with the autumn ploughing: whatever ploughing is done should be left as rough as possible.

PESTS.

No codlin moth-affected or diseased fruit of any kind should be left on the ground after the crop has been gathered. These should all be destroyed by boiling.

All rust-affected foliage and fruit of plum and peach trees, as well as all other stone fruits that have been attacked by this and other fungus diseases, such as shot-hole, &c., should be burned if possible. This will minimize the possibility of future attacks.

The Vegetable Garden.

Autumn weeds must be kept out of the kitchen garden. These rapidly grow, and remain as robbers right through until the spring time.

The section should be well dug over for planting winter crops. Before digging a light sprinkling of bonedust and a good top dressing of stable manure should be spread on the surface. These may then be dug in, as they provide humus for the soil. Large plots should be avoided in winter; where such occur a path should be run down the centre. This will provide more efficient drainage. The beds, too, may be more raised than in the summer time.

Early onions may be planted out in the beds, and, if not already done, onion seed should be planted at once.

All classes of seedlings may be planted out, and seeds of lettuce, early peas, beet, carrots, radish, cabbage, cauliflower, and swede turnip may be sown.

Asparagus beds should be cleaned up and cut down as soon as the berries begin to colour. Celery rows should be kept earthed up: rhubarb beds should be given a dressing of manure to encourage the coming winter crop, and new rhubarb plantations may now be established.

The Flower Garden.

All classes of spring-flowering bulbs may now be planted. In bulb planting the bulbs should not come in contact with any manure. The manure should, some time previously, have been dug well in, and mixed with the soil, and all heat should have disappeared. If manure is required it should be placed below the bulb, so that the roots may ultimately penetrate to it. Bulbs thrive in sandy soils, and where the soil is heavy a little sand may be added to advantage. Bulbs should not be planted too deeply; the depth to plant is generally regulated by the size of the bulb. Such bulbs as freesias may be covered with only an inch of soil, while larger bulbs may be somewhat deeper.

The increasing prevalence of both bulb mite and rhizoctinia fungus in attacking bulbs makes it a matter of urgency that all bulb gardens and plots should be well dressed with lime before the bulbs are planted. The lime should be dug into the soil; and after the bulbs have been planted, a top-dressing should also be given. Each dressing need not exceed 2 ozs. per square yard. Clifts's manurial insecticide is also good.

Dahlias and chrysanthemums may be fed with liquid manure, or mulched with stable or poultry manure. In any case the feeding should not be too strong nor too frequent, and it should always be withheld before the flowers come.

All hardy annual, biennial, and perennial seeds may now be planted. Among these are dianthus, candytuft, sweet peas, Iceland poppies, anemone, ranunculus, stock, wallflower, columbine, foxglove, phlox, penstemon, pansy, gaillardia, &c.

Wherever aphis and red spider occur the plants should be sprayed with benzole emulsion, nicotine, pestend, or soaperine, or some other preventive in order to protect the coming flowers. Mildew attacks on the rose should be warded off by the use of sulphur. The sulphur may be either dusted on the plant or it may be scattered on the ground around and under the plant.

March is one of the best months for transplanting evergreen plants of all classes, trees, shrubs, and palms. The roots of the transplanted plants should be disturbed as little as possible, while the roots of those transplanted from pots should be well uncoiled and set out before planting.

The soil is now warm, and the roots will quickly take hold and grow. They are thus established for the winter, and will give little or no trouble in the subsequent summer heat and dryness.

In preparing the soil for planting the trees care should be taken not to dig small holes. A small hole is simply a "pot hole," in which the winter water accumulates, and as a result the young tree roots are rotted.

A large hole should be dug; or better still, the whole planting area should be well cultivated all over, and the plants or trees then set out in this cultivated area.

REMINDERS FOR APRIL.

LIVE STOCK.

Horses.—Those stabled should be fed liberally. Food of a more stimulating nature can now be given to get them well over the "changing coat" season. Those doing fast or heavy work should be clipped; if not wholly, then trace high. The legs should not be clipped. Those not rugged on coming into the stable at night sweating freely should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Yearling colts if vigorous and well grown may be castrated. Weaned foals should have a little crushed oats daily, if available. Horses to be turned out during winter should not be clipped. Their mouths and feet should be examined and attended to where necessary.

Cattle.—As the nights become colder the dairy cows should be rugged. The rugs should be removed in day-time when the shade temperature reaches 60 degrees. If new grass is plentiful, give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. It will be found profitable to give a few pounds of bran, crushed oats or pollymeal in addition to other feed, to all cows giving a fair quantity of milk. Read article by Mr. B. A Barr, "Food Values and Rations," in *Journal* for September, 1916. Algerian oats should be sown on suitable land for grazing off in the winter. Sow a mixture of oats, rye, and tares or peas for winter fodder or to fill silos. Irrigated lucerne may be scarified in autumn, Algerian oats sown, and in this way good feed provided for cows in winter. Only exceptional cows or those required for city milk supply should be served between now and July. Within the next two or three months is the best time for cows to calve, as they will pay to feed through the winter, give the best returns for the season, and be dry when the feed is dry and at its worst. Calves should have lucerne hay or crushed oats when grass is not plentiful. Take care that salt lick previously recommended is available. One or two pounds of linseed cake or meal given daily should be found beneficial. In addition to its feed value, the oil in the cake or meal will counteract the effect of dry feed, which is liable to cause impaction.

PIGS.—Sows not already served should be put to the boar. Supply all pigs with plenty of bedding, and see that sties are warm and well ventilated. Supply sows liberally with grain. Castrate young boars as early as possible. Pigs should be highly profitable now, as pork is very dear. Rape, barley (especially skinless), oats, &c., may be sown for grazing during winter.

SHEEP.—Merino and fine cross ewes, if mated early, will lamb from now on. Those in lamb to the larger British breeds of rams can be expected to give a certain amount of trouble in lambing.

Close attention should be given morning and evening to save every lamb possible, and pick up any ewes that may be cast. If the ewes are well-woolled sorts, they will need crutching, at the same time clear wool from around teats, and from the eyes. If the ewes are attentive mothers, any lambs that are found dead after these precautions, apart from weather conditions, foxes, &c., are just as well gone. Give purgative drenches at first sight of ewes appearing ill in any way. Give warm salad oil to any lambs that appear ailing. Ewes after difficult parturition or retention of after-birth can often be saved by flushing out with ½ oz. Lysol to 3 pints warm water. Reserve fresh pasture, or better still, sow a mixed green crop to turn ewes into later on, but not while carrying the lambs, this is too often injurious. On fine mornings when attending ewes, if feed is plentiful and ewes strong castrate as many ram lambs as possible, they are easily caught when two or three days old. Place them between the feet on the ground, no holder is necessary. In districts where conditions make second dipping a necessity, see that it is done before the weather becomes too unsettled.

POULTRY.—Do not feed maize this month—soft food aids moult; add a teaspoonful of linseed to each bird's ration once daily. The more exercise the hens get the better they moult. Add to drinking water one packet of Epsom salts to twenty birds. Keep a sharp look out for chicken pox. Forward pullets should now be in their winter quarters, with plenty of scratching litter, and fed liberally—including ration of animal food. Grit, shell, and charcoal should always be available.

CULTIVATION.

FARM.—Dig potatoes as they mature. Cart out and spread stable manure. Finish preparation of land for main cereal crops. Sow Chou Moellier seed in beds for transplanting. Sow the following mixture per acre for green feed during the winter months for the dairy herd:—1½ bushels, Oats; ½ bushel, Cape Barley; ½ bushel, Tick Beans; ½ bushel, Pease. Sow Giant Drumhead Cabbage for transplanting (1 lb. sufficient for 1 acre, in rows 3 feet apart); provided the soil is in good friable condition, plants from seed sown last month should be planted out. Sow wheat and oats according to locality; also rape for winter feed or green manuring. Prepare clean seed-bed for lucerne; and sow Hunter River, Arabian, or Peruvian seed, free from dodder, in drills 7 inches apart and at the rate of 12-16 lbs. of seed per acre. Sow permanent pastures with grasses and clovers.

VINEYARD.—Examine "Yema" grafts to see if strings require cutting. Consideration must be given to manuring; early application is strongly urged. Peas, &c., for green manuring should be sown as soon as possible.

Cellars.—Cleanliness is emphatically urged. Carefully remove all fermentable refuse—skins, lees, skimmings, &c. Such odds and ends favour multiplication of Vinegar Flies (*Drosophila funebris*). If present, destroy these with formalin or insecticide powders. A little bisulphite or sulphurous acid in washing water is recommended; also free use of lime on floors, &c.

ORCHARD.—Prepare land for planting; plough deeply and sub-soil. Plant legumes for green manure. Plant out strawberries. Clean up Codlin Moth from trees as soon as all fruit is gathered.

FLOWER GARDEN.—Plant out evergreen shrubs, trees, and Australian plants, divisions of herbaceous plants, seedlings, layers, and rooted cuttings. Feed chrysanthemums with liquid manure weekly until flowers begin to open. Prepare land for future plantings of roses and shrubs. Keep dahlias tied to stakes.

VEGETABLE GARDEN.—Plant out seedlings from the seed beds. Dig all vacant spaces roughly. Sow onions for early crop; also peas and broad beans. Clean out asparagus beds wherever the seeds are ripening.

WINTER FODDER CROPS

Somner's Special Mixtures

No. 1—Rye, Dun Peas, Golden Tares (Vetches), Barley or White Oats, mixed quantity, sufficient for 1 acre - 15/6

No. 2—Oats, Cape Barley, Golden Tares, Tick or Horse Beans, Partridge, Dun, or Blue Peas, mixed quantity, sufficient for 1 acre - - - - - 18/6

Special price for large acreages.

Either of these mixtures, if cut or pastured in Winter and ploughed under in August, will make a good preparation for Lucerne to be sown in August or September.

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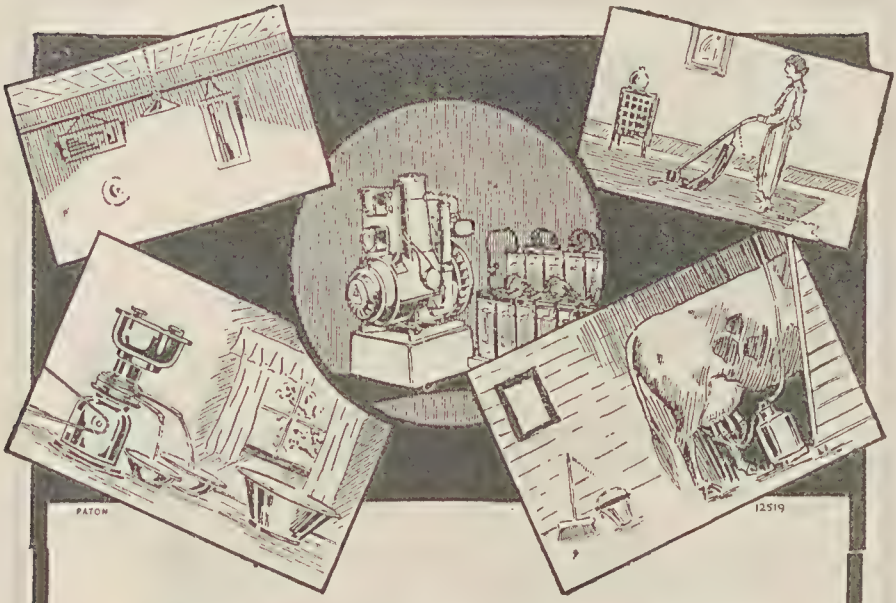

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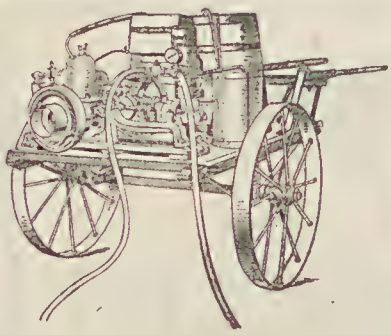

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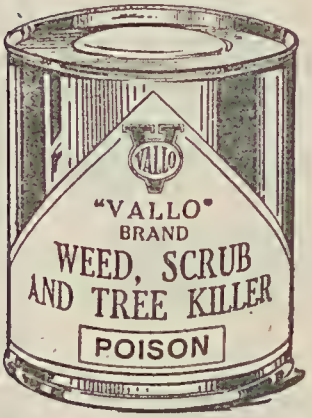

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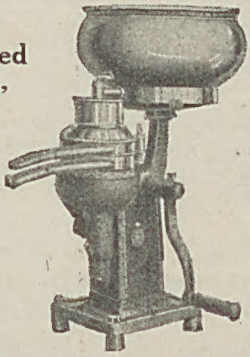

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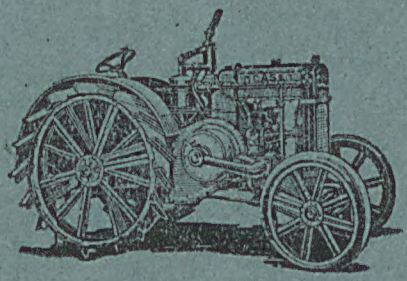

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